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ABSTRACT

One of three publications of the Research on Equitable Access to Technology (REAT) project, this directory lists 52 computer education programs in northern California, Nevada, and Utah that have successfully addressed the problem of providing computer access to groups of students who are far less likely than others to use computers, i.e., low-income, minority, low-achieving, limited-English speaking, female, and rural students. Each listing provides information about the goals and objectives of the program as well as target students, general information, activities, equipment and software used, results obtained, implementation factors, and contact people. An introductory section describes the Far West Laboratory's (FWL) program and the survey process, and provides an overview of the equitable access issue together with descriptions of the three REAT publications and two related FWL publications. A list of other selected resources provides information on two non-FWL publications on equitable computer access, as well as a list of seven selected organizations concerned with computer equity. Indexes provide cross references to the programs by target audience, geographical location, and school level (elementary school, middle or junior high school, senior high school, and adult or continuation school). (36 references) (EW)

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COMPUTERS FOR ALL CHILDREN:

A DIRECTORY OF PROGRAMS FOSTERING EQUITABLE ACCESS TO COMPUTERS

**Janet Crist-Whitzel
Pamela Sharp
Nancy Ellis**

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***Far West Laboratory for
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November 1985

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FAR WEST LABORATORY

FOR EDUCATIONAL RESEARCH AND DEVELOPMENT

**COMPUTERS FOR ALL CHILDREN:
A DIRECTORY OF PROGRAMS
FOSTERING EQUITABLE ACCESS TO COMPUTERS**

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November 1985

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Leonard Beckum was the original Principal Investigator of the project until he left to become the Dean of the School of Education at The City College of the City University of New York. Dr. Beckum was an important force in the initiation of our work in technology and equitable access. Stefan Dasho, also no longer at FWL, was part of the initial staff team for REAT as well as an earlier partner in the development of the concept and proposal. The work would not have commenced without the efforts of these two colleagues.

Several others played important roles, too. Charlie Ray Altizer undertook the large task of reformatting, combining, and editing our computerized program descriptions and designed the final form of the directory. Anita Madrigal assisted in some of this editing and Jean Barker helped out with the introduction. Jessica Paul assisted with the organizational task of the indexes and helped put all the pieces of the directory together in its final form. Michael Hunt, Marie Paul, and Rebecca Becker all helped with various phases of the project work.

We owe a great deal of debt to many colleagues and educators in California, Nevada, and Utah who nominated programs to be included in our directory. We especially thank the many educators associated with such programs who completed and returned their questionnaires, talked with us by telephone, and graciously invited us to visit their programs.

INTRODUCTION

This directory is a guide for educators who want to know more about providing equitable access to computers for their students--computers for all children. It gives descriptions of 52 programs that have successfully addressed the problem of providing computer access to groups of students who are far less likely than others to use computers: low-income, minority, low-achieving, limited-English speaking, female, and rural.

Why Equitable Access to Computers is Important

The issue of equitable access to computers in education is critical to the educational community. Study after study over the past few years has confirmed that certain groups of students are missing out on the opportunities afforded by computer instruction in our nation's schools (Arias, 1984; Karoff, 1984; Marrapodi, 1983; see also Crist-Whitzel, 1985). Inequities exist for these groups in terms of both quantity (amount of computer use) and quality (type of instruction) of access to computers in schools (Anderson et al., 1984; Becker, 1983a, 1983b; Podemski et al., 1983). Students in affluent school districts are four times as likely to have computer access than students in the poorest districts (Anderson et al., 1984). Racial minority students are even less likely to have computer access (Becker, 1983a, 1983b). And advantaged students don't just have more computer instruction--they also use computers in more advanced ways. High-achieving students often learn programming and higher level applications, while low-achieving students, when they do have access, tend to use the computer mainly for drill and practice. Thus, advantaged students learn to control the computer; disadvantaged students are controlled by the computer (Arias, 1984; Becker, 1983a, 1983b; Karoff, 1984).

Why is it so important for all children to have access to computers? Some researchers have estimated that by 1990 eight out of ten jobs will require computer knowledge to some degree (Fisher & Finkel, 1983; Frank, 1983). Although these figures have been disputed (Levin & Rumberger, referenced by Siegel, 1983), there is no doubt that if young people lack computer skills, their ability to obtain jobs in the information age will be hindered if not prevented.

Educators are concerned that the documented inequities in computer access will not only have far-reaching implications for the future workforce, but also widen the already existing gap between the "haves" and the "have nots" (Anderson et al., 1984; Karoff, 1984; Mace, 1983; TERC, 1983). The underserved groups will be relegated to a permanent underclass (Castillo, 1984; Euchner, 1983; Karoff, 1984), seriously damaging the nation's social and economic well-being.

Why This Directory Was Compiled

In order to encourage equitable access to computers for all children, Far West Laboratory for Educational Research and Development has been researching ways to meet the needs of underserved student groups. This directory is the

result of an intensive effort to identify programs that increase access to computers by underserved student groups and to disseminate that information to educators. We hope that programs already in place in schools can serve as models that will suggest ideas and effective strategies for making the benefits of computer learning available to all students.

How This Directory Was Compiled

We sought programs that were either developed specifically for groups of target students or that have demonstrated success with them even though the programs were not originally designed with target students in mind. We were particularly interested in programs that focused on higher order computer uses and skills such as programming, problem solving, and applications of the computer as a tool to help students organize, structure, analyze, and report on problem-focused classroom activities (e.g., data base management, record keeping, and word processing). We were also interested in computer uses that enhanced on-task cooperative work and social interaction within the classroom, because these instructional strategies have been shown to be effective for many minority and disadvantaged students (see Crist-Whitzel, 1981). Of less interest were programs that focused mainly on drill-and-practice uses of the computer for target students: however, a number of the programs included in this directory did use tutorial and drill-and-practice CAI effectively as part of their programs. We did not include programs targeted to special education students in our search, as we felt that population comprised a target group with additional unique needs and would merit a separate search effort by researchers with a background in that field.

We found that, while computer education is spreading with dramatic speed, few programs are specifically designed to address the needs of our target students. Nevertheless, we did find numerous programs that have successfully trained underserved groups of students.

We identified these programs by conducting an extensive field research process in Far West Laboratory's three-state region (Northern California, Nevada except for Clark County, and Utah). Educators and other concerned people were contacted by mail and phone and asked to recommend schools or other organizations that provided computer access to underserved groups of students. Our experts included representatives from the state departments of education in three states; TEC Centers and county offices of education in Northern California; school districts in Nevada and Utah; regional service centers in Utah; computer manufacturers and various organizations concerned with technology and/or equity issues (including Computer Using Educators, the National Commission on Industrial Innovation, the California School Boards Association, Association of California School Administrators, teachers' unions, California Association for Bilingual Education, the California Association of Compensatory Education, California Media and Library Educators Association, Educational Technology Foundation, and regional race and sex desegregation assistance centers, among others), and individual educators who are leaders in the field of computer education, especially those with a known interest in issues of equity (e.g., educators and researchers at Stanford, EQUALS, MESA, EPIE, and AIR, among others).

We then contacted the schools and organizations identified by our experts and asked if they wanted to participate in our study. First, each school was asked to complete a survey which provided us with information about the populations and numbers of students served; the program goals and objectives, content, and activities; equipment and software; implementation aspects; and accomplishments to date. This survey also served as a paper screening for determining which programs we should investigate in more depth.

Some programs were selected for in-depth study on the basis of potential interest for target student populations; the reported use of innovative practices or practices designed specifically to remediate the lack of access for disadvantaged or other target students; and, where possible, the perceived benefits of the programs in terms of useful computer training, reduced disaffection, and enhanced student motivation and achievement opportunities in other areas.

We conducted site visits to some of the selected schools or made in-depth telephone calls to them to examine program goals, program development, curriculum materials, management of instruction, methods, and program results.

From our questionnaires and field documentation we compiled this resource directory describing computer education programs with positive impact on low-income, minority, low-achieving, limited-English speaking, female, and rural students in schools within Far West Laboratory's region, and a companion handbook, "Computers for All Children: A Handbook for Program Design" (Sharp & Crist-Whitzel, 1985) which provides a set of guidelines and strategies for implementing effective computer education for underserved students.

How to Use This Directory

This directory provides descriptions of a variety of computer education programs that foster equitable access. The sizes of programs range from pilot projects implemented by a single teacher in her or his classroom to district-wide programs. Although most of the programs occur in school settings, several are sponsored by outside organizations and implemented in non-school locations. Some approach the problem of access from a perspective of providing a program for ALL students at a site, while others target a specific population or populations considered to have a lack of opportunity that needs to be redressed. All of these models can suggest good ideas that can be used in almost any setting.

Each school or agency listed in this directory has a program that addresses the issue of equitable access to computers. Organizations are listed alphabetically by name. For each entry, we describe the program, give general information about the school and program, types of computer activities, equipment and software, and results of the program, if available: for many programs, we also mention various factors that were perceived to play key roles in the implementation process. At the end of each entry we provide the name, address, and phone number of a contact person (or persons) who can provide more information about the program.

Even though a program may be targeted to particular groups of students, ideas that are successful for one group may hold promise for another. Many of the needs of the various underserved students can be met in similar ways; thus, the reader should not restrict her or his reading solely to programs that target one certain group, but rather learn something from all of them.

For those readers who do wish to identify programs that target a specific category of students, we offer an index at the back of the directory which cross-references programs in a number of ways. First, programs are categorized by type of underserved group: low-achieving, low-income, specific minority groups, female, rural, and limited-English speaking. Second, they are classified geographically: California, Nevada, and Utah. Finally, they are categorized according to school level: elementary school, middle or junior high school, senior high school, and adult or continuation school.

Our directory is intended not only to describe programs but also to encourage educators to exchange ideas and information with one another. After reading about a program of interest, therefore, educators can call or write the contact person for more information. The directory concludes with a bibliography for further reading and some additional resources that might be of interest to readers.

We do not claim to be comprehensive or exhaustive in spite of our extensive search process, and our descriptions vary in depth, depending on the amount of information provided to us by program personnel. We know of additional programs that were recommended to us, but we did not receive the needed program information and thus were unable to include them. We solicited short-form program nominations at the Computer Using Educators annual conference in October 1985 and received quite a number of responses; however, with the timing so near the end of the project's contract period, we found we were not able to follow up on these programs and include them here. However, we feel this directory gives a representative glimpse of programs that provide effective computer education to underserved students. We hope that it will serve as a useful resource to many educators concerned with computers and equitable access.

Other Resources Available

This directory was produced as part of a larger effort, the Research on Equitable Access to Technology (REAT) Project, funded by the National Institute of Education and conducted at the Far West Laboratory to identify, document, and disseminate vital information about programs to increase access to microcomputers by underserved groups of students. Descriptions of this directory, its companion publications from the REAT Project, and reports of related interest by Far West Laboratory are included on the following two pages. In addition, selected resources from other organizations concerned with equity issues and educational technology will be found following the list of references at the end of this directory. Interested readers may wish to investigate those resources.

PUBLICATIONS
Research on Equitable Access to Technology and Related Work

Research on Equitable Access to Technology Project:

Computers for All Children: A Directory of Programs Fostering Equitable Access to Computers. Janet Crist-Whitzel, Pamela Sharp, and Nancy Ellis (November 1985).

This resource directory provides descriptions and contact persons for over 50 computer education programs (most of them in schools) identified in a region-wide survey of Northern California, Nevada, and Utah as effective programs for various underserved groups of students (including minority, disadvantaged, low-achieving, rural, female, and limited English-speaking). Entries for each program include a general description with goals, objectives, and target students; general information about the school and the program; types of computer activities; equipment and software; and results of the program if available. For many programs, factors that seemed to affect the implementation process are also listed. The document includes a description of the REAT project and the survey process, a brief overview of access issues, references, and additional selected resources.

Computers for All Children: A Handbook for Program Design. Pamela Sharp and Janet Crist-Whitzel (November 1985).

This guidebook is designed for educators wishing to implement computer education programs for underserved students (including minority, disadvantaged, female, low-achieving, limited English-speaking, and rural). The handbook provides portraits of a variety of effective programs; a review of equitable access issues and studies; an overview of hardware and software needs; a focus on what children need to have a successful and equitable learning experience with computers; and a spotlight on what schools and communities can do to ensure equitable access to computers. Lists of references and selected resources are included.

Computers for All Children: A Literature Review of Equity Issues in Computer Utilization. Janet Crist-Whitzel (November 1985).

This report outlines equity issues and documents lack of access to technology in both quantity and quality of use for underserved students (including disadvantaged, minority, limited English-speaking, female, low-achieving, and rural students). The report also draws implications for computer education programs from literature on effective instruction and outlines implementation issues. References are included.

Other Related Publications:

Achieving Equity: Student-Led Computer Training. Paper presented at the annual meeting of the American Educational Research Association, New Orleans (1984). (ERIC document, ED 248 848).

This paper describes the background, procedures, and operation, and evaluates the results of a demonstration project of the Center for Research on Equitable Access to Technology in Education (CREATE) at the Far West Laboratory using computer-literate high school students to teach and tutor disadvantaged and minority high school students as an approach to achieving equitable access to computers for those students. Classes described and evaluated included an ethnically-mixed group of students from one inner city high school; a group of all Hispanic students from a second inner-city high school; and a group of all Samoan students from various high schools, some of whom were dropouts. The program was successful for these groups of students who learned programming, developed their own computer programs, and had positive attitudes toward the class, the student trainers, the teaching strategy, and computers. (49 pages, including references and tables).

Effective Teaching for Desegregated Settings: A Review and Application of Research. Janet L. Crist-Whitzel (1981).

This report was produced for the Multi-Ethnic School Environments Project at the Far West Laboratory and provides an overview of the research on effective instruction and its implications for disadvantaged and minority students. (66 pages, including references).

DIRECTORY OF PROGRAMS

Program Description. Lowry offers a course in Computer Accounting targeted to rural high school students in the eleventh and twelfth grades. The main goal of the program is to familiarize students with the advantages of using a computer for accounting procedures and to increase students' knowledge about computers and accounting. It is hoped that students will learn to be creative in the application of accounting principles. Students are provided with a realistic approach to automated accounting principles and a hands-on approach to the way automated accounting systems function. The course consists of five major accounting systems commonly found in computerized accounting environments. These five systems are: general ledger, depreciation, accounts receivable, accounts payable, and payroll.

General Information. The need for a computer accounting course was identified by the Business Department. The Business Department planned and designed the program and, together with the Administrative Department, initiated the program in 1981 with six students. The superintendent, school board, administration, and business department have cooperated to make the course a regular part of the school's offerings. Students in the bookkeeping and typing classes are encouraged to take the computer accounting course. Only 11th and 12th graders are eligible to take computer accounting: currently, 12 students are enrolled. The State Department of Business and Vocational Education is interested in the program because of its individualism and creativity with accounting.

Activities. Program activities include simulations, word processing, and tasks in accounting and other financial areas. Students work individually.

Equipment and Software. Software applications in use include Automated Accounting on Micro-Computers and Key City Sports (simulations). There are 12 computers in place.

Results. A formal evaluation has been conducted, but results are not available at this time. Over half of the students who take the accounting course later enroll in higher level business courses. The entire staff has become more aware of the capabilities of computers.

Contact Person:

Eddie Booth
Teacher
Albert Lowry High School
P.O. Box 831
Winnemucca, NV 89445

Telephone: (702) 623-4447

AMERICAN INSTITUTES FOR RESEARCH—BIG BROTHERS/SISTERS OF SANTA CLARA
COUNTY

PALO ALTO AND SAN JOSE, CALIFORNIA

Program Description. SISCUM (SISTers and COMputers): An Out-of-School Co-Learning Computer Curriculum is targeted to students from low-income, single-parent families. SISCUM was designed by the American Institutes for Research (A.I.R.) for girls aged 9-14 with little or no prior exposure to computers from disadvantaged, single-parent homes and implemented in conjunction with Big Brothers/Big Sisters of Santa Clara County (as well as Central Maryland). In the future, boys will be included in the target group. Program goals are to (a) provide information about how computers work and how they are used; (b) help students develop competence in using computer equipment and software; (c) promote self-confidence, comfort, and self-efficacy in computer environments; (d) use an existing "sister/brother" relationship to serve as a surrogate for parental encouragement and to create adult female and male role models for girls and boys; (e) develop a model for computer learning in community organizations that can be replicated in youth-serving environments; and (f) conduct outreach activities that serve several types of audiences and have promising mechanisms for replication of the model. The goals of each of the five curriculum units in the program are (1) an introduction to computers, including keyboard familiarity, computer terms and operations, and software exploration; (2) an introduction to spatial, problem-solving, and programming concepts using games and Logo; (3) an introduction to word processing and graphics, with an opportunity to create printed products; (4) the expansion of problem-solving and programming skills with logic games and Logo; and (5) the expansion of skills in word processing and graphics, with the opportunity to create a finished product.

General Information. The need for the program was determined by W.E.E.A., in collaboration with several Big Brother/Sister agencies. Need was based on broad research that pointed to gaps in computer exposure for females, minorities, and disadvantaged populations. Staff persons at A.I.R. planned and designed the program; staff persons from the Big Sisters agency in Santa Clara cooperated in helping to initiate the program.

The program began as a pilot project in May 1984; the transition to agency implementation began in November 1985. The Big Brother/Big Sister agency intends to integrate SISCUM as part of their regular offerings, and AIR plans to work with the national agency to disseminate SISCUM to other interested agencies throughout the country.

Activities. Program activities include introduction to computers, programming, problem solving, simulations, word processing, graphics and story-making, and learning games. Participants work in cross-aged pairs as Big and Little Sisters. Adult volunteers are recruited by a Big Sisters agency to work with students from the ages of 9 to 14. Participants attended ten weekly, two-hour classes after school or in the evenings.

Equipment and Software. Software applications used in the program include Print Shop, Story Maker, PAWS, Educational Classics, Inside Story, Logo, The

Factory, Gertrude's Puzzles, and The Bank Street Writer; there are two computers.

Results. SISCOM has developed an instructional co-learning model that can be implemented in a variety of community settings to serve a variety of target groups (e.g., Big/Little Brothers, parents/children, and seniors/young persons). They hope to explore the possibility of broader dissemination over the next few months. An orientation package was designed during the final stage of the project to help participating agencies implement the program independently.

An evaluation of the program was conducted, but data from surveys and observations have not been fully analysed. However, informal observations and interview responses indicate that participants (a) developed competence and confidence in the ability to operate and use a computer; (b) experienced a new type of interaction--learning together--and learned new things about one another; (c) recognized the value of exploratory and trial and error learning; (d) reduced their fear of computers and computer technology; (e) began to understand the capabilities and limitations of computers; and (f) sought to increase their knowledge of computers outside the realm of SISCOM.

Implementation Factors. Factors contributing to the success of the program include (a) a co-learning approach; (b) a choice of highly motivating, easy-to-use software; (c) highly motivated participants (volunteers); and (d) a dedicated staff at agencies and at the American Institutes for Research.

A potential problem is the need for careful and close supervision/co-ordination by agency staff. Scheduling and attendance must be monitored to facilitate maximum use of available computers and time and to provide "hot-line" assistance for participants who experience learning and/or equipment problems.

Materials Available. Descriptive information and dissemination materials on SISCOM, as well as a packet of training ideas for equitable computer learning, are available from A.I.R.

Contact Persons:

Jean M. Wolman and Jane Schubert
American Institutes for Research
in the Behavioral Sciences
P.O. Box 1113
1791 Arastradero Road
Palo Alto, CA 94302

Telephone: (415) 493-3550, Extension 234

Program Description. The computer program at Bachrodt is targeted to low-achieving Hispanic students in elementary grades one through five, and serves students through SIP and Chapter I funding. The goals and objectives of the SIP program are to (a) provide help to all students in building basic skills; (b) provide computer awareness training for all students; and (c) provide LOGO and word processing experiences for a selected group of students (teacher choice). The program also provides additional help to Chapter I students, especially in reading, language, and math.

General Information. Initiated by a resource teacher, the program has been a regular part of the school's offerings since 1982. Specific needs were determined by the entire staff of the school and a parent advisory group. Actual planning and design was done by a group of representatives from each grade level.

The program has expanded as money has become available, as software for specific curriculum objectives has become available, and as students have developed skills in using software such as Logo.

All 750 students in the school participate; every student spends 20 minutes a week with a computer, either alone or with a partner. Students in Chapter I programs spend an additional 20 minutes a week.

Activities. Grades three, four, and five are introduced to Logo. Grades one through five learn to use word processing software. All students use tutorial and drill-and-practice software, which is tied to the curriculum in their classrooms. Students work independently about half the time and in pairs the other half of the time.

Software and Equipment. MECC elementary software, Sunburst Memory software, and Hartley drill-and-practice software in reading and math are used. Random House materials on reading, comprehension, and inference are also utilized. The school now has 25 computers, networked to a hard-disk system, a ratio of one computer for every 30 students.

Results. Teachers report that students are highly motivated to do their work on the computer and have very positive feelings about the computers. Students seem more willing to practice skills and to write on the computer than they do off the computer. They seem to enjoy the individualized practice that the computer offers.

Contact Person:

Marie Sikora
Bachrodt School
102 Sonora
San Jose, CA 95110

Telephone: (408) 998-6211

Program Description. The computer program at Bell is called the Educational Technology Program and is targeted to low-income and low-achieving students at the elementary level. The goals and objectives of the program are to (a) provide hands-on computer experience at all grade levels; (b) integrate the computer as a learning tool, with an emphasis on critical thinking and problem solving using computer-aided instruction, word processing, database management, spreadsheets, graphics, and programming; (c) understand the societal impact of computer technology on lives and careers and technological consumer skills; and (d) develop skills in the operation, care, and maintenance of the equipment. The computer project started as a lab with six computers.

General Information. Bell Avenue School is located in a low income suburban area. 520 students, or 80% of the total student body, have been identified as low-achieving and are in the Chapter 1 program: of this group, approximately 24% are Black, 14% are Hispanic, 3% are Asian (including Filipinos and Pacific Islanders), and 1% Native American. The majority of students qualify for AFDC, and the school has a 50% mobility rate. The district formed a task force in Spring 1983. The Chapter I Resource Teacher determined the need for the program and initiated, planned, and designed its implementation. The Resource Teacher is coordinator of the school computer program and acts as a resource for other teachers. Each classroom has a computer, and each teacher is responsible for helping to make the computer program a regular part of the school's curriculum.

Although guidelines for the district educational technology courses have been set, the program has not yet been fully implemented. The overall goal is for all students to be able to use computers as aids to problem solving in a variety of disciplines. The use of computers is integrated into all grade levels and into a variety of subjects throughout the curriculum.

The district has developed a plan for staff development for educational technology. Workshops are held to increase teachers' general knowledge of computers, classroom applications, word processing and databases, and programming in LOGO and BASIC.

Activities. Activities include programming (LOGO), problem solving, word processing, and accessing databases for classroom research (future goal). Students usually work in pairs or individually; occasionally they work in groups of four or more.

Equipment and Software. The program uses various problem-solving applications, as well as LOGO and BASIC software. Students have or will have access to MECC material, Gertrude's Secrets, Puzzles, and Bumble Games. Because the school is a TEC center Region 4 pilot school, they focus on word processing using Magic Slate. There are currently 10 computers and 3 sound synthesizers available, and more computers are expected under an AB 803 grant.

Results. An informal evaluation revealed that the program has not yet been fully integrated. Although no formal evaluation has been conducted, school staff plan to study the 1986 CTBS test data and compare that with the 1985 data.

More teachers are beginning to use computers on a regular basis; the program has expanded since initial inception from six computers and two printers to four additional computers.

Implementation Factors. Implementation factors concerned the number of computers, installation space, and relating the available software to the curriculum. Problems that occurred in implementing the program included (a) trying to fit entire classes into a small computer room (remedied by moving to a larger room); (b) keeping idle students busy when there were too few computers to go around; (c) teachers being able to oversee the whole classroom operation when there were several computers in use; (d) lack of knowledge of available software and how to use it; (e) lack of software that related to regular curriculum; and (f) lack of knowledge as to how to relate the software to the curriculum.

Contact Person:

Paula Weiss
Teacher
Bell Avenue School
1900 Bell Avenue
Sacramento, CA 95838

Telephone: (916) 922-0202

CALVIN SIMMONS JUNIOR HIGH SCHOOL

OAKLAND, CALIFORNIA

Program Description. Two of four computer programs at Calvin Simmons are the Computer Enhanced Math Program and the Parent Education Program. They are targeted to Black and Hispanic students at the junior high school level. The goals and objectives are to (a) teach math as a problem-solving endeavor; (b) provide students access to computers as tools; (c) build parent awareness of the value of computers in their children's education; and (d) meet district standards in math.

General Information. Calvin Simmons Junior High is located in a low socio-economic area of Oakland. The school population is 47% Black, 43% Hispanic, and 10% Asian. Of 1,100 students, 1,050 are low-achievers in one area or another and 400 are limited-English speaking. (Fourteen languages are spoken.) Between 70% and 80% of the students qualify for a free lunch. There are four computer education projects at the school: a skills lab using the Dolphin program from Houghton Mifflin, an eighth-grade Logo elective course, the Parent Education program, and the Computer Enhanced Math program. Descriptions of the Computer Enhanced Math program and the Parent Education program follow.

Computer Enhanced Math Program. The Computer Enhanced Math program is a pilot program for seventh-grade math students, now in its first year. Three classes of students are selected through normal class assignment procedures and consist of standard, on-track math students. Class takes place in the computer lab, a room with 12 computers at work stations and tables for groups of four students. Class size ranges from 32 to 37 students.

The program began in the imagination and experience of the teacher, who had been dividing her teaching time between the school district and the Lawrence Hall of Science in Berkeley. At Lawrence, the teacher had been working on program design and development that centered on equal access problems. On returning to full-time teaching, the teacher looked for a school that would allow her to develop a computer-enhanced math program to meet her own objectives, as well as to conform to the requirements of state and district guidelines (see above). The principal of the junior high accepted the teacher and her program, allocating a large share of computer resources to the program and providing administrative support as well.

Parent Education Program. The parent education program, which began in 1985, is designed to teach parents about computers in general, how computers can help their children learn, and what educational software is available for use in their homes. It is felt that even in this low socio-economic community, parents who are already purchasing items such as microwave ovens and videotape recorders would purchase a computer for their children if they knew its value and if they had help in making selections. One aim of the program is to help parents with decisions regarding the purchase of a computer for use at home; another is to let parents know what is going on in the computer programs at the school, so that they will support such programs for their children.

A series of five evening workshops were designed for parents and taught by the math/computer teacher. The teacher focuses on software for learning and how parents can use it in their homes.

Activities. Program activities include working with Logo, computer-related problem-solving activities, and simulations. Software reviews are also included among activities for parents.

In the Computer Enhanced Math Program, four students are usually grouped around a computer, but occasionally groups consist of only one or two. Students generally work with others in their own groups, but sometimes the teacher assigns new partners in an almost random manner. The composition of groups is changed every few weeks to insure that some students don't dominate others over a long period of time.

Equipment and Software. The hardware consists of 12 computers located in a lab. Software applications in use include Logo, commercially developed problem-solving software, and a math program developed at a local university.

Results. A formal evaluation of the math program has not yet been conducted. It will consist of standard assessments of achievement in Math, as well as measures of how students develop problem-solving strategies. Informally, the teacher has seen an increased ability to verbalize intricate strategies, to create problems, and to solve problems. She has seen higher, more regular attendance in her classes than previously attained in the school. Parent attendance at the evening program is unusually high: fifty families attended originally, completely filling the computer room and causing the program to expand to a second section on another evening.

Implementation Factors. Start up problems have been mostly logistical (e.g., how to best use a limited resource, when to schedule classes, etc.). The computer lab is used during other periods for eighth-grade classes in Logo, taught by another teacher. Factors that have helped get the program started are the teacher's background--including her experience at Lawrence Hall of Science, a network of colleagues, support of the principal, and a grant from a major computer company.

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Program Description. One of the computer programs at Crittenden is an art program targeted to Asian immigrants and other minorities in grades five through eight. The goals and objectives are to (a) develop skills in visual communication; (b) build an understanding that the arts are a means of expression; and (c) develop English proficiency through verbal interaction.

General Information. Crittenden Middle School receives large numbers of immigrant Asian children who often enter school with no English language ability. As many as nine different languages are spoken at the school.

At the request of the principal, the art teacher agreed to develop a special art course, primarily to provide success experiences for these newcomers. The teacher, having interests and skills in both video production and computing, developed a course in visual communication for these youngsters that involves the use of those technologies.

In the art room, during a regular daily art period, children work in small groups to develop short video tapes on art-making processing. The tapes have animated titles, made using Logo and recorded directly on the video tape. The groups all have specific tasks to perform for the production of the tapes. One group develops their skills in the art-making task; for instance, paper folding. Another group learns enough Logo to program an animated title; a third group learns about the video camera.

Within groups, students have specific tasks that may change from day to day but that are fairly well defined and can be learned nonverbally or with the use of very little language. Within a real context, everyone becomes an expert as problems of production are identified and solved. As far as the students are concerned, the task at hand is to produce video tapes on art-making for other students in the school. Students take control of technology to produce a product, which is then shared with the larger student body.

Language development is not emphasized. Of course, in the excitement of using computers and video equipment, and in the quiet pride of accomplishment in creating an art form, children use English to talk with each other about their tasks.

Activities. Activities include programming in Logo, video production, and art making. Students work in small groups.

Equipment and Software. Software used is Logo. The hardware consists of a computer with disk drive and color monitor along with a VCR with video camera.

Results. Only informal evaluation has been conducted. It's obvious to everyone that children become deeply involved in their cooperative problem-solving activities. During computer class, the art room takes on the look and feel of a video production studio. (The teacher teaches a more standard art

curriculum during other periods of the day.) The students convey solid feelings of pride and satisfaction in their work.

Implementation Factors. In this school, all the "official" computers are gathered in a lab situation, heavily committed to an established computer literacy program taught by a computer teacher. To meet her objectives, the art teacher at first borrowed the kind of computer she needed and an interface for video recording. As the program became recognized outside the school, it came to the attention of a large computer manufacturer who then provided a newer, more up-to-date computer for the program. The teacher uses the school's video equipment.

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DR. MARTIN LUTHER KING JUNIOR HIGH SCHOOL

SAN FRANCISCO, CALIFORNIA

Program Description. Dr. Martin Luther King Junior High serves a population of Black, Hispanic and Asian students in grades six, seven, and eight. More than half of the students are identified as low-achieving. King is a new school that presently shares an older building with Phillip Burton Academic High School, and like Burton, was established as a result of a consent decree. A new building for the school will open in the fall of 1986. King is a magnet school, attracting students from all over the city who want to participate in a very traditional curriculum (all students take Latin). New students are selected by lottery from a waiting list. All sixth-graders take a one-year course in computers, consisting of one 50-minute class each day. The objectives of that course are to (a) develop intensive keyboarding skills, practiced on sixth-grade vocabulary words; (b) develop understandings about the role of computers in everyone's lives; and (c) learn to program in BASIC in order to improve critical thinking and problem solving skills.

General Information. The sixth-grade classes are taught by a computer teacher. Students in grades seven and eight come to the lab once a week with a regular subject area class and teacher to learn word processing and use it in the context of that subject area. These classes are led by a computer resource teacher whose goal is to have the subject area teachers take responsibility for their own classes in the computer lab. The long term goal of the staff is to gradually phase out the lab as computers become more widely used in classrooms.

Activities. Students work in pairs at the computers, except when word processing. One of the goals of the school is that students will participate in student team learning activities and that they will have opportunities to gain expertise and share this with other members of their teams. The computer lab and the "learning-to" program provide multiple opportunities for such sharing.

Hardware and Software. Students work with BASIC programming; software packages include word processing applications.

Results. Since the program is new, no evaluation results are presently available.

Implementation Factors. Most of the teachers presently don't know very much about computers and how to use them. Since King is a new school and almost all staff time is devoted to startup planning, teachers have even less time for learning about computers. To help remedy the problem, teachers are encouraged to take computers home in the evenings and on weekends.

Even though emphasis is placed on teachers learning how to use computers, teacher literacy is developing slowly, so a two-part plan was devised: first, to give incoming sixth-graders the most intensive training (a one-year course) and thereby enable those students to become tutors in their regular classrooms, helping the teachers use computers as part of the ongoing curriculum; second, to involve teachers once a week with their seventh- and eighth-grade classes in the computer lab, with the computer resource teacher modeling the use of computers, as they are integrated into the existing curriculum.

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DUCHESNE SCHOOL DISTRICT

ROOSEVELT, UTAH

Program Description. The Young Mothers Program at Duchesne is targeted to young mothers who are Basic Core students at the adult education level. The program includes individualized Basic Core high school equivalent courses, a course in computer literacy, and information about prenatal health care and nutrition. Program objectives focus on (a) individualized instruction, (b) outcome-based-education, and (c) extension work.

General Information. This is a program for young women who have dropped out of school to have children. The need for the program was determined by the State Board of Education. School personnel designed and planned the program, and the Director of Adult Education initiated the program and made it a regular part of the school's curriculum. The program began in 1985, with personnel trained during the summer.

Activities. Activities in the program involve problem solving, simulations, word processing, and database software. Students work individually and in pairs at the computer as part of the whole curriculum.

Equipment and Software. Software applications used include the Scott Foresman Computer Literacy Course and the A.E.S.O.P. program (for all subjects). The latter covers the Basic Core requirements for high school graduation for most subjects and also includes objectives, tests, and record-keeping. Other software programs offered include O.B.E. cooking. There is one computer for each student.

Results. The program is still in its initial stages, and no evaluation has been conducted.

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EDUCATIONAL PRODUCTS INFORMATION EXCHANGE (EPIE)

BERKELEY, OAKLAND, AND RICHMOND, CALIFORNIA

Program Description. The Community-Classroom Computer Connection (4C) Program targets urban minority junior high and middle school students, primarily Blacks and Hispanics, and their parents in the East Bay. This program is part of EPIE's 4E Project (Excellence and Equity through Electronic Education), which has funding from the San Francisco Foundation. Designed by Educational Products Information Exchange (EPIE) and implemented in cooperation with the Mathematics, Engineering, Science Achievement Achievement (MESA) program at UC Berkeley, the 4C program's goals are to provide families with the skills they need to use a computer at home for educational activities and to develop working programs whose operation could then be assumed by the schools themselves. Specific objectives are to provide students and parents with basic information needed to (a) set up a computer; (b) troubleshoot when a computer doesn't work; (c) load and run software; and (d) read computer manuals for additional instruction.

General Information. This program began in 1984-85 as a pilot project in four East Bay schools: Claremont Middle School and McChesney Junior High School in Oakland; M. L. King Junior High in Berkeley; and E. M. Downer Junior High in Richmond. An EPIE Consultant designed the program, pooled resources with the MESA Program, and obtained computer donations from a computer company. A key feature of the program was to allow families to check out computers for home use. The EPIE Consultant worked with principals and teachers at each school to develop a working model of the program for each site. Small, rotating classes are held at each school. Workshops consist of three evening sessions of two hours: families check out computers after the second session. Sessions are team-taught by the EPIE Consultant and a colleague experienced in computer education. After the pilot phase, the schools continued to run the program on their own.

Activities. Program activities include basic computer operations, computer literacy, some programming, and use of software. Students and parents work together in pairs at the computer in a team-learning situation.

Equipment and Software. Each school site is equipped with 12 computer systems, including disk drives and printers. The software used includes Atari Writer, VisiCalc, Sunburst, and others.

Results. The outcomes for participants during the pilot program were very positive. Project staff saw parents and students learn to respect each other's strengths and exhibit a family cohesiveness as they worked in the team-learning venture, especially when students taught their parents about computers. Students seemed to develop a sense of accomplishment and self-esteem when they were able to teach their parents. Even parents with prior computer experience seemed to learn something about computers and working together as a result of taking the class with their children. Outcomes for the program were also positive: all four schools planned to run their own workshops in order to

continue the program, and a network of parent computer users is growing as a result of the program.

Implementation Factors. Key factors in the program's success include a cooperative relationship among the participating organizations; the teaming of students and parents in the learning situation; and the ability of families to check out computers to use in their homes.

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EMPIRE GARDENS ELEMENTARY SCHOOL

SAN JOSE, CALIFORNIA

Program Description. The Computer Lab program at Empire Gardens has many facets. It is targeted to a largely Hispanic urban population with a wide range of needs. The school has a commitment to providing a full range of computer education for all children. Specific program goals differ for different groups of children, according to their needs. Students come to a lab during the school day and also use computers in their classrooms. A program is offered before school for children needing extra help with basic skills in reading and math.

General Information. Empire Gardens' school population of 534 includes 69% Hispanic, 15% White, 6% each Asian and Filipino, 3% Black, and 1% American Indian students. Computer learning occurs in a computer lab and in classrooms. Most activities are supervised by a highly organized and competent bilingual staff of one teacher and two aides working with small groups in the computer lab. All children in grades 3-5 use the computer lab twice a week for one-half hour for either developing new skills or for individualized review and practice of basic skills. In addition, all children in grades 3 and 4 participate in a computer-based problem-solving curriculum. All kindergarteners take turns in the lab, and all children in grades 1 and 2 use computers in their classrooms as part of their regular curriculum.

The computer lab, decorated with student art, is run very efficiently. When students come into the lab, they find their own folders at their assigned computers with a diskette and a record sheet. The student boots the diskette and begins to work. The teacher and aides circulate around the group of 10 or 12 students, answering questions. At the end of each visit, record sheets are marked and folders are collected. The computer teacher and classroom teachers review the progress of each student and prescribe software to meet individual needs. At any one time, a group of students are working with different software at different speeds.

Activities. Activities include computer-assisted instruction in math and language arts, problem solving, and Logo. Students work in pairs in the problem-solving activities and individually in review and practice activities.

Equipment and Software. Problem-solving and Memory Skills software from Sunburst, problem-solving software from The Learning Company, TECC software, and a variety of math and language arts computer-assisted instruction packages, including DLM and Milliken, are used. The EISI Catalog is heavily used. There are 5 computers for Chapter 1 students, and 15 computers funded through SIP and AB 803 funds. Equipment also includes two carts.

Results. Everyone in the school seems to be in full support of the computer program, including teachers, parents, administrators, and students. Students show a high regard, respect, and motivation for their computer activities by getting right to work in the lab and by volunteering to work at lunch and after school.

Implementation Factors. Key factors in the program's success are the high degree of commitment on the part of both the administration and staff. Other faculty at the school have pooled aide time to allow for a concentration of resources in the computer lab. There is a need for more software: it is felt that some of the money needed for software should come from the district. A specific need is in the area of bilingual software. There is also a need for more funding for teacher time: currently, the teacher is only .75 FTE.

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Program Description. The Peer-Managed Computer Training Program was designed and implemented in 1983 by CREATE (Center for Research on Equitable Access to Technology in Education) at the Far West Laboratory in San Francisco. This program targeted low-income, low-achieving minority and female students. The project hired several computer-literate high school students to develop a curriculum and teach computer programming to a group of students from an inner-city high school. The goals and objectives of the program were to (a) provide access to computers for underserved students; (b) demonstrate that students could effectively provide computer training to their peers; (c) show that low-achieving and low-income students who do not have the typically required math courses could learn to program computers; and (d) develop a training program that could be implemented elsewhere.

General Information. During 1983, three groups of inner-city students participated in the program held at the Laboratory. The pilot class, an inter-ethnic group of 12 students from one high school, was taught during spring semester after school. Two groups were taught during the summer: a group of 10 Hispanics, both limited and non-English-speaking; and a group of 11 Samoan students from various high schools. The SFUSD granted credit to those completing the summer program. All classes lasted a total of 42-45 hours of training over 6-7 weeks, typically in two-hour sessions three times a week. For the summer classes, students who successfully completed the pilot class were also used as tutors. In addition, an Hispanic student from the target school who knew both Spanish and BASIC was added as a tutor. He served in that capacity for the Samoans as well, but he was especially helpful to the Hispanic LEP students by translating some of the guide sheets on commands and statements into Spanish.

After the Spring 1983 pilot program, the focus of the class was expanded beyond BASIC programming to include a general introduction to computers, as well as demonstrations and hands-on tryouts of various software. However, most of the curriculum continued to focus on BASIC, due to limited hardware that had a small memory and little available software.

The program was expanded during the Summer of 1984 to include two additional groups of underserved students. A class for youth on parole with the CYA (California Youth Authority) was held at the Laboratory, and a class for a group of Upward Bound students was held at a local university, where the group was participating in a summer residence program.

More software was included in the Upward Bound class, as there were both more sophisticated equipment and more available software in the university's computer lab. In that program, hands-on sessions were held in the lab during the second hour of class, while "lecture" and discussion sessions were held in the first hour in a nearby classroom. In addition, part of the time was devoted to talking with students about how to set up a similar program at their schools.

Activities. Activities included programming in BASIC, with students typically working in pairs. The five trainers took turns giving short presentations on programming topics (e.g., statements, commands, and flow-charting). Those not teaching a particular lesson circulated as tutors. During periods of hands-on activities to practice the commands and concepts, all trainers served as tutors. The last three weeks of a class were devoted to students writing their own programs, typically games. Classes in the summer where credit was given included regular work sheets and periodic tests for grading. Students typically worked in pairs, but sometimes worked individually when the computer-to-student ratio allowed it. During the program development phase toward the end of the class, students were rotated in some classes to allow individual use of computers.

Equipment and Software. The classes held at the Laboratory used six computers with data cassette recorders and one printer, which was used for printing listings of programs and for word processing when that was added to the classes. Three other computers, each a different type, were used for demonstrating and trying software when the program was expanded to include more than just BASIC. The lab that was used for the Upward Bound program contained 16 computers with attached disk drives and two printers. Effective software used in the various classes included built-in BASIC, Master Type, Speedscript (a public domain word processor), The Factory, Logo, and computer games written by previous students.

Results. These classes were successful for groups of students who otherwise would not have had the opportunity or the interest to learn about computers. By the end of the classes, most students were able to write successful computer games or other programs with the help of the trainers. Class performance was not related to academic achievement at school; in fact, females as compared to males, and Samoans (several of whom, especially the females, had dropped out of high school) as compared to other groups, have had lower grades in school but higher performance in the computer class. Thus, the strategy was particularly effective for females and Samoans, but the Hispanics and others were successful as well. Students reported greater interest in computers as a result of taking the class, and they liked having other students as their teachers. They particularly liked having several trainers there, so they could get help faster.

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FRANKLIN YEAR ROUND SCHOOL

OAKLAND, CALIFORNIA

Program Description. The computer program at Franklin is targeted to limited English-speaking minorities (mostly Black, Hispanic, and Asian) at the K-6 level and all students covered by Chapter I. EIA, LEP, and SIP funding are involved in the program. Goals and objectives of the program are to (a) develop language skills (over 80% of students come from non-English-speaking homes) and (b) teach skills of critical thinking and reading in context.

General Information. The school contracts with three private companies to use programs based on computer delivery of language arts lessons: the IBM Writing to Read Lab for grades K-1; Prescription Learning for grade three; and Hoffman Critical Thinking Skills for grades 4-6.

The school is adding a word processing lab for grade two to follow up the Writing to Read Lab in K-1.

Activities. Program activities include problem solving and the use of database software. Students typically work at computers in pairs, but frequently work individually, and occasionally in groups of three.

Equipment and Software. The school has 24 computers for 946 students participating in the program. Software in use includes Write to Read, Prescription Learning Lab, and Hoffman Critical Thinking Skills.

Results. Formal evaluation has not been completed, but observations by teachers indicate impressive development of students' speaking and writing skills. Teachers also report positive effects of the program in motivating students who were not being reached in the regular classroom setting. The principal reports that the program has allowed the school to stabilize its curriculum and meet the needs of the large and very diverse student population. Parents, teachers, and administrators are committed to the program.

Beyond the facilitation of learning skills, a program representative stated that the program also carries an important message to the students, over 80% of whom come from homes where English is not spoken. "[The program] builds confidence in the African or Asian child that he can use the technology of his or her new country and that the future [will] include him or her and not be a future where technology is [just] for others."

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Program Description. The computer program at Gardnerville is a local ESL and remedial reading program targeted to Hispanic ESL students at the elementary level. The objective of the program is to develop students' abilities to work independently in their regular classrooms.

General Information. The classroom program was developed by a local teacher, using computers in primarily individualized instruction with 12-15 Hispanic LEP students. The program was developed and initiated by the reading specialist as a response to a lack of any regular LEP program in the district. Any students who do not speak English as their first language are included in the program. An assortment of materials is used, depending on the individual student. Students have a computer in each regular classroom, but get extra computer time when they are working with the reading specialist.

Activities. Program activities include problem solving, simulations, word processing, and use of database software. Students typically work in pairs at the computers, but also frequently work individually, and occasionally work in groups of three.

Equipment and Software. The available software includes Story Machine, Kid Writer, Magic Slate, Body Awareness, and Memory. Computers are located in the Reading/ESL Specialist's classroom; in addition, there is a computer in each regular classroom.

Results. The program has operated informally for two years. No formal evaluation has been conducted, but it is the opinion of the teacher that the ESL students become "... better writers than many regular students because they learned to write on a computer." Students in the program also develop positive attitudes toward using computers, being in school, and writing, according to teacher observations and testing. The teacher feels that computers are a powerful tool, especially for writing.

Implementation Factors. The reading specialist feels the most important factor in the program's success is the teachers' willingness to incorporate computers into the curriculum.

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GEORGE WASHINGTON CARVER ELEMENTARY SCHOOL

SAN FRANCISCO, CALIFORNIA

Program Description. Carver is one of four schools in the Bayview/Hunters Point section of San Francisco that have been targeted for major change under a Consent Decree entered into by the National Association for the Advancement of Colored People, the California State Department of Education, and the San Francisco Unified School District. It was agreed that major emphasis would be placed on the improvement of the quality of educational services of the four schools in order to attract youngsters from various racial/ethnic groups in the city to these sites.

Knowing that parents throughout the district must believe that if their children enroll in Carver (or one of the other three schools), they will learn more effectively, learn more, and/or learn different skills than they will if they attend other schools in the district, Carver staff has worked together to create a school that has a number of exemplary programs, including the computer program.

The computer program has two components: a computer lab of 24 networked computers and 14 computers on mobile carts. The computers on carts are available for teachers to use in their classrooms on a sign-up basis. The lab is used for reading and math computer-assisted instruction, word processing, and Logo. For CAI, kindergarteners come to the lab for 40 minutes a week, first- and second-graders come once a week for 25 minutes, and third- through fifth-graders come for 45 minutes a week; for Logo, third- through fifth-graders come in the afternoons for 45 minutes a week. In addition, the computer teacher (a former classroom teacher) teaches a math class in the lab every day.

General Information. Carver school is located in a low-income, predominantly Black neighborhood. Because it has been successful in attracting students from other areas of the city, it enjoys a racial mix that includes Black, Hispanic, and Asian students. Seventy-five percent of the students have been identified as educationally disadvantaged.

Activities. Activities include computer-assisted instruction in reading and math, Logo, and word processing. Students work individually at the computers.

Equipment and Software. Software is selected by the teachers to enhance learning of district-targeted objectives. Kindergarteners, for instance, learn to alphabetize, to recognize initial sounds, to match colors and shapes, to count, and then to add. Logo is taught as a problem-solving activity. There is a laboratory with 24 computers networked to a hard disk storage unit; there are an additional 14 computers on carts for movement from classroom to classroom.

Results. The program has resulted in high interaction among students in the lab, improved attitudes toward math for both boys and girls, and, in general, a joy for learning.

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Program Description. One of the computer programs at Grant is called the Teen Parent Assistance Program and is targeted to school-age parents (mostly Black females). The general goals of the program are to assist school-age parents to (a) increase marketable job skills in order to effectively compete in the labor market; (b) reduce school drop-out and the need for AFDC; (c) reduce repeated pregnancies and births; (d) improve early parenting and survival skills; and (e) help students qualify for unsubsidized jobs. Specific goals of the computer program are to (a) emphasize the skills and processes that promote students' abilities to understand computers and related technologies; (b) recognize the implications of being part of a rapidly changing information society; and (c) appreciate the power of the computer and related technologies and by understanding the applications of computers in personal and work situations. Learning objectives are designed so that each student will be able to demonstrate and define (a) major technological advances leading to the development of the computer; (b) components of a computer and the function of each; (c) computer use and typical computer tasks; (d) various types of computer languages and their major differences; (e) the building blocks of computer programs and their uses; (f) the writing of simple BASIC programs; and (g) problem solving by breaking the problem down (i.e., define the problem, outline the solution using a flow chart, write and enter a program, and then test and debug the program).

General Information. Of the total Teen Parent Assistance Program (TPAP) enrollment of 160, 106 are enrolled in the computer program; 96 are Black and all but 5 are young women. All students in the TPAP are school-age parents who have dropped out of school before earning a high school diploma. Special efforts were made to recruit target students through (a) a program for pregnant minors; (b) teachers, nurses, and counselors who work with public school students in the district; (c) community health, social, and child-care services; and (d) flyers and program brochures. Present staff is not large enough to handle all referrals.

TPAP began with outreach and support services in May 1981. In March 1983, instructional services were added. Students selected are public school dropouts and school-age parents. The program is held at a continuation high school. Class size is small; nine students work in a lab with nine computers. Instructional methodology includes group questions and answers, reading aloud, records of progress on a bulletin board, information sheets, overhead transparencies, and textbooks, but most of the instruction involves individual work on the computer with one-to-one help from the teacher.

The focus of the curriculum is on basic skills and job skills. Topics related to employment include typing, word processing, use of a calculator, and general office skills. Basic skills development includes reading, GED preparation, and self/career awareness. Employment readiness, including real work experience using computers, is a major concern.

Activities. Computer program activities comprise programming, problem solving, word processing, spreadsheets, database software, accessing databases for classroom research, and reinforcement of language, math, and reading skills. Students typically work individually at computers.

Equipment and Software. Software packages used include Word Pro 4+ (word processing), Infopro (database), and Visicalc (spreadsheet). Other class materials used include Structured Basic by South-Western (text for BASIC programming), teacher-made workbooks, and teacher lectures accompanied by transparencies. Nine computers in the lab serve nine students per class.

Results. Ongoing evaluation (funded by the C. S. Mott Foundation) has been conducted for the past three years. Evaluation has monitored the impact of the program on students versus a companion group who had no intervention. Objectives are the basis for criteria in the evaluation design. Program intervention has shown increase in high school re-entry and graduation, decrease in dropout and repeated births, and increased entry into the job market. Program data reveals that students have (a) obtained jobs; (b) passed GED tests; and (c) passed District Proficiency exams. Anecdotal information sources show that (a) former students return to say what the program meant to them; (b) students don't "fear" machines; and (c) students praise themselves by planning celebrations to affirm their achievements.

Implementation Factors. Six factors contributing to the success of the program are (1) a high-energy staff with openness, flexibility, and the permission to try what they think will work with individuals; (2) confidence of private foundations and public agencies who invest grant funds in the education and training of school-age parents; (3) encouragement from the District Superintendent, administration staff, and Board Members to pursue development of a unique program; (4) students who want to better their conditions and prepare for their futures and their children's futures; (5) success, proven by the evaluation data, which breeds success; and (6) a program director willing to try, fail, and try again.

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Program Description. The Language Arts Computer Lab at Hawes is targeted to low-achieving Hispanic students in Elementary grades four through six. The primary goal of the program, formulated by the District Technology Plan, is to integrate computers and video technology as tools in the instructional process in order to improve student achievement throughout the curriculum. The Plan's objectives are (a) within three months of entry into computer Lab, 75% of the students will learn basic keyboarding skills; (b) all students will reach mastery level in 60% of the Language Arts lessons; (c) all students will be able to compose, write, and edit a 100-word paragraph on the word processor; and (d) 70% of students in the Lab will write and edit a 250- to 350-word letter, report, or creative writing assignment.

General Information. All students in grade six and more than half of those in grades four and five attend the lab daily for 25 minutes. The need for the program is based on extremely low test scores of the target group of students. Students are engaged in a sequential program to develop their Language Arts and Writing skills by learning basic computer use, and then they progress to the use of tutorial language arts programs, keyboarding, and basic word processing. Activities culminate in student-authored publications.

Teachers are responsible for large-group instruction, and the lab is staffed by a computer technician. Eventually, all students in the school will have an opportunity to participate.

Activities. Program activities include word processing and tutorial computer-assisted instruction. Students work in pairs.

Equipment and Software. Software applications used include Hartley Publications language skills packages, Wizard of Words, Crossword Magic, Magic Spells, Story Tree, Microtype Keyboarding, Milliken Word Processor, The Print Shop, and The Newsroom. There are 7 computers serving 14 students per class.

Results. The program will be evaluated by several types of instruments, ranging from mastery checklists to standardized tests.

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Program Description. Houston's Computer Lab, Room 19, is targeted to rural Asian and Hispanic students in grades four through six. The curriculum includes keyboard skills, screen editing, graphics exploration, and BASIC programming. The objectives are to (a) overcome fear of machines; (b) supplement reading and math skills development; (c) learn keyboard and editing techniques; (d) learn what computers can and cannot do; and (e) become comfortable with on-screen composition, saving work on disk drives, and using a printer.

General Information. Houston Elementary School has a population of 718 students in grades K-6. However, only students in grades 4-6 are in the computer program--a total of 368 students.

Students come to the lab as part of an elective program designed to supplement classroom activities. An additional computer is moved by cart from class to class, as needed. Scheduling of classes is done weekly and must be flexible to fit in with other activities, such as music programs and field trips.

Because scheduling is irregular, long-term planning is difficult. As a consequence, the computer lab offers many kinds of short-term experiences with a variety of software packages, permitting students the opportunity to explore the many different uses of a computer. Lessons are varied to meet the needs of students, from letter matching to word processing. Students learn to solve problems with graphics and sounds--learning processes unavailable to students anywhere else in their experience.

Activities. The program includes activities in programming, problem solving, word processing, financial software, letter matching, spelling, and punctuation. On Saturdays, the computer lab is used by the Migrant Education program for student workshops and for inservice training for school aides and Special Education teachers.

Equipment and Software. Software applications used in the program include Mastertype, Bank Street Writer, Oregon Trail, Lemonade, Wordsearch, Print Shop, and Logo. The lab has 12 computers for use by students in grades 4, 5, and 6; an additional computer is used for the GATE class.

Results. Although no formal evaluation of the program has been conducted, teachers report that there is high motivation on the part of students to attend computer classes and that students appear to gain increased self-confidence through involvement in the program.

Implementation Factors. The scheduling of classes must be done each week and by each teacher, which complicates long-term planning and scheduling of classes.

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Program Description. The computer program at the Institute was called Youth Technical Careers and was targeted at economically disadvantaged high school students, teenaged mothers, the educationally handicapped, and dropouts, ages 16-21. The programs goals and objectives were to (a) develop basic skills in English, Language, and Math; (b) develop business education skills and work maturity; (c) develop electronic assembly skills; (d) provide employment; and (e) offer training to enable participants to pass the GED test or return to high school.

General Information. This 16-week program was funded by JTPA and offered one time, in the Spring and Summer of 1984. It was a special offering of ICT, and not a part of the regular curriculum. The three components of the curriculum included Basic Skills in English and Math, and Electronic Assembly. The Basic Skills courses focused on practical applications and skills related to every day reading and writing, simple financial and checking account transactions, and understanding and filling out a variety of application forms for employment and other purposes.

Weekly staff meeting were held to discuss individual students' problems and successes. The class was organized as a "work site" with students responsible for maintaining behavior appropriate to a job. Group discussions helped students learn job application and job retention skills.

Activities. Activities included word processing, financial applications, and ESL software. Students typically worked at the computer individually, but also frequently worked in pairs, and occasionally in groups of four or more.

Equipment and Software. Software used in the program included Master Type, Typing Tutor, Adventures in Math, Write, and Applied Word Processing. The computer-to-student ratio was one-to-one.

Results. Of the original 27 students, only two dropped out of the program. Only two students were working when they entered the program, but by the end of the program all but three had jobs, two of which were in a computer company or using technical skills directly taught by ICT. Several students earned their GED certificates or returned to school. Other reported benefits included better self-attitudes among the students and increased responsibility for attendance, punctuality, and personal attitudes. A report to the ICT Board stated that parents had called to remark on these positive changes they noted as a result of the program.

Implementation Factors. The teachers and aides were carefully chosen for their ability to work on an individual basis with students who tested at the 3rd- and 4th-grade levels in basic skills. Their dedication and patience contributed to the program's success.

It was found that not enough time was allocated for recruitment, and the start-up date had to be extended. Also, the 16-week program needed to be extended to accomodate late-arriving students.

Because of a change in funding requirements of a heavier emphasis on work maturity competency skills, ICT did not reapply for continued funding. Fiscal limitations prevented ICT from supporting the program further on its own.

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IVANHOE ELEMENTARY SCHOOL

IVANHOE, TULARE COUNTY, CALIFORNIA

Program Description. The Word Processing Computer Center program at Ivanhoe is targeted to rural students, including minorities, disadvantaged and low-achieving, in grades four through six. The objectives of the program are to improve students' editing skills and to teach them to use a computer for word processing.

General Information. The program began in January 1985 as a pilot program in one fourth-grade class of 33 students. It is now a regular part of the school program and is held in a new computer lab that serves all 258 students in the fourth, fifth, and sixth grades: nearly half the students are Hispanic. Students are learning to use word processing, an extension of the regular classroom writing activities. After working on creative writing or other written assignments, the students then go to the lab to enter, edit, and proofread their work using the word processing program. Finished work is then printed out on computer paper.

The hours the word processing lab is open have been extended. Parent education classes are held in the lab in the evenings. Additional computers have been placed in individual classrooms to meet the demands of the now highly-skilled students.

Activities. Students work individually on word processing activities, including keyboarding, word processing, loading and saving files, and printing. The word processing system uses icons for its menu, making the software easy to learn and use. The computers used in the program are inexpensive, and the screen editing features are very user-friendly.

Equipment and Software. Students work in a new computer lab using the Homeword word processing application. In addition to the computers in the lab, computers have been placed in some classrooms.

Results. Although no formal evaluation has been conducted, several beneficial results of the program have been observed. Teachers and lab aides report high student motivation, and parents have voiced support for the program in interviews, citing improved student attitudes toward rewriting. Teachers have also documented improvements in students' writing skills as well. Overall, students have improved their rewriting skills and are motivated to proofread and edit their writing.

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GILROY, CALIFORNIA

Program Description. Computers on the Move is a Title VII Project at Jordan for parents that began in 1983 as part of a larger school-based computer education program in a rural agricultural community of about 22,000 people. The city's population is composed of 48% Hispanics, many of them migrant families, and many have limited abilities in English and other marketable skills. Computers on the Move is a mobile computer program--computers are moved to parents' neighborhoods in a bus that has been converted into a computer lab.

The goals of the program are for parents to (a) become involved with their children's educational program; (b) develop computer awareness; and (c) develop proficiency in English, their second language.

General Information. The school staff felt that their ESL students needed support at home for their work with computers. The staff also felt that unless parents understood what their children were doing with computers, they would be unable to support them at home. Moreover, they were concerned that these parents would become alienated from their children who were not only learning to speak English, but were also entering the "computer age."

For the first group, five parents were selected from a pool of parents recruited by a community liaison through home visits, mailings, phone calls, and a tour of the mobile computer lab at different locations. The five were chosen by drawing names from a hat.

Although parents participate in lessons on English language skills in which English is used, computer literacy classes are conducted using Spanish. Computer commands are translated. Parents work with computer awareness materials, keyboarding programs, and word processing software. They work individually at the computers. During the second year of the project, children were invited to participate with their parents.

Activities. Parents work individually at computers most of the time. group lessons and individual practice. Activities include a mixture of teacher-directed, total-group lessons, and individual practice. When their children come to the class to be taught by the parents, they work in parent-child pairs.

Equipment and Software. Program activities include the use of problem-solving software as well as keyboarding and word processing software. Audio lingual drill-and-practice software is used for E.S.L. Actual software used includes Binet International, Intellectual, Hartley, Magic Slate, TECC materials, Teasers by Tobbs, and The Factory.

Results. An evaluation of the "Computers on the Move" project was conducted throughout the 1984-85 school year. The evaluation activities focused on the major components of the project: the project parent outcomes, project student outcomes, staff development, and project implementation.

The results of the evaluation indicate that the project, in its second year of implementation, is doing an exemplary job. Parents exhibited significant increases on language development as well as positive increases in their attitudes toward school. In interviews parents were very positive about the program and its effect not only on themselves, but also on their children. The project student outcomes were also very positive. Although there were no differences in attendance rates for project and nonproject students, attitudes toward school and academic achievement did yield positive results.

Implementation Factors. The use of the mobile computer lab and the efforts of a community liaison worker are keys in securing the participation of parents. Problems that had to be dealt with included parent transportation to the mobile lab site and the need for childcare, especially for single mothers.

Materials Available. "Computers on the Move", A Title VII Demonstration Project Final Evaluation, Gilroy Unified School District, 1984-85, by Alex Gonzalez, Ph.D., Principal Evaluator, is available to interested parties.

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or

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GILROY, CALIFORNIA

Program Description. About one hundred students attend the Migrant Education Extended Day Program at Jordan Elementary School. The district program for Hispanic students who must qualify as children of migrant families has been in operation since 1982. The program is designed to supplement rather supplant regular programs and is voluntary for the 480 identified migrant students in the district. Students are bussed to the program from all schools in the district; youngsters in grades one through three come three times a week for 30 minutes. Students in grades four through six come once a week for the same amount of time. The program is staffed by two credentialed teachers, two aides, and a college student. The program staff communicates with classroom teachers once a month on content and skills to be supplemented. Actual computer activities are selected by the computer teacher.

General Information. The goals of the program, in addition to supplementing regular school-day classroom activities, are to help students learn to operate successfully at least three programs of their own choice. The programs include all of the keyboard and operation skills listed for the regular school-day program. Since the students are high-mobility students (children of migrant farm workers), at least one program is introduced for each 12 days of computer lab attendance. Older students are required to use the computer for word processing, turning out at least one piece of written work for every 24 days of attendance.

Activities. Students work on word processing and with graphics software. All students learn to handle disks properly and to execute a simple set of commands in a word processing environment. Students also use software for computer-assisted instruction as suggested by their classroom teachers. Students work individually at the computers.

Equipment and Software. Jordan School shares its lab of 31 computers and a small number of printers with the extended day program. Software used in the program is also shared with Jordan and includes word processing software, CAI, and educational games.

Results. Parents and teachers report that student are very enthusiastic about the computer lab. They complete homework assignments more often and have developed better self-concepts since using computers.

Implementation Factors. The support of parents is considered a key factor in the success of the program.

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Program Description. The Computer Education program at George targets the entire student population, which is largely Hispanic. Components of the program are Computer Education/Logo for sixth graders; Graphics for seventh graders; and Problem Solving, Data Base, and Word Processing for eighth graders. A focus on Keyboarding is part of the curriculum at all three grade levels. Goals for the sixth-grade students are to (a) develop strategies for attacking problems and gain comfort in using the computer to implement these strategies using Logo and (b) become familiar with the QUERTY keyboard and increase typing speed. Seventh-grade goals are for students to (a) develop the necessary skills needed to operate and program a computer in BASIC and (b) become familiar with the keyboard and increase typing speed. Goals for eighth graders are to (a) develop awareness and skill in using problem solving strategies via software, (b) enable students to use a data base as an information tool, (c) integrate computers into the curriculum by increasing writing skills and using computers as part of the writing curriculum, and (d) develop reasonable touch keyboarding skills to enable students to use computers efficiently in school and leisure pursuits. Specific sets of objectives accompany each of these goals, primarily aimed at developing skilled and efficient keyboarding, structured thinking, problem solving skills and strategies, creative design (graphics), writing skills, and integration of word processing into writing activities.

General Information. George is located in a school district with many Hispanic students: 48% of its 620 students are Hispanic, 37% are White, 5% each Black and Asian, 3% Pacific Islander, and 2% other. About 600 of the students participate in the computer program, which is a regular part of the curriculum at each grade level. Sixth graders are pulled daily from regular classes for a seven-week period, half the students coming from one classroom and half from the other classroom. The seventh-grade program operates similarly. Eighth graders receive a 9-week elective class. All students at each grade level participate. A new state AB 803 grant focuses on the keyboarding and writing segments of the program: three weeks of small group instruction is given to eighth graders (including special education students) for writing, with the assistance of Language Arts teachers.

The computer education program began at the school in 1980 as a pilot program for 30 G.A.T.E. students and became a regular part of the school's program in 1983-84. Over time it has changed from a part-time, pull-out CAI and programming class to a full lab, operating daily with additional scheduled applications classes. The administration and computer teachers determined the need for the program and planned and designed it. Two teachers initiated the program, and the administration was responsible for making it a part of the regular school offerings.

Activities. Computer activities in various parts of the total program include programming, graphics, problem solving, simulations, word processing, data base management, and keyboarding. Students usually work in pairs at the computers and occasionally work individually as needed and as possible.

Equipment and Software. Software used in the program includes Microtype, Magic Slate, Logo, and BASIC. There is one computer for every two students in a lab class.

Results. No formal evaluation has been conducted. The program's overall success is reflected by its steady growth over a number of years, by the incorporation of Language Arts teachers into the program, and by the beginning integration of computers into the school's curriculum (writing).

Implementation Factors. The support of the administration and the program materials were cited as key factors in the program's success. Starting slowly and having knowledgeable staff have also been important. Problems encountered have included: large classes and a small classroom, both of which still present a concern; a lack of software, especially in the early stages, a situation which has improved; and insufficient ventilation in the lab, which hopefully will be resolved by the planned installation of air conditioning.

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Program Description. Logan has a program called Personal Computing and You which is targeted to Black, Hispanic, Filipino, and female students at the high school level. The goals of the one-semester program are to (a) examine the applications of computers and their impact upon society; (b) investigate the professional and career opportunities in computer-related fields; (c) learn elementary programming in the BASIC language; (d) determine the adaptability of certain types of problems to algorithmic solution; and (e) learn how to operate a personal computer using available software.

General Information. The course was started by the department chairman with help from four other instructors in determining the need for the program. The program has become a regular part of the school's offerings. Starting as one course, the program was subsequently split into two courses: Personal Computing and Computers and Math. The PC course is a one-semester course; the prerequisite is proficiency in reading and math (see above for goals and objectives). The Computers and Math program is a two-year program. The first year of Computers and Math is called Introduction to Computer Science; the prerequisite is either a "C" or better in two semesters of geometry or teacher permission. The second year is Advanced Computer Science; the prerequisite is a "C" or better in Computer Science.

Of the 226 students enrolled in these courses, approximately 35% are White, 38% Filipino and other Asian, 16% Hispanic, and 11% Black. Close to 60% are females.

Activities. Activities include programming, problem solving, word processing, and database software. Students work in pairs or groups of three.

Equipment and Software. Various applications in BASIC are used, as well as Turbo Pascal and Karel the Robot. There is a ratio of one computer for every 2.5 students in a class.

Results. This program has been very effective in attracting minorities and females. Many go on to the higher level course. Presently, there are more girls than boys in the computer classes, and the minority representation is equal to that of the school as a whole.

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MATHEMATICS, ENGINEERING, SCIENCE ACHIEVEMENT--EAST BAY CENTER

BERKELEY, CALIFORNIA

Program Description. The first Junior High Summer Program of the East Bay MESA (Mathematics, Engineering, Science Achievement) Center of the University of California at Berkeley was held for the first time in summer 1985 and was targeted to high-achieving minority junior high school students. The program was an enrichment activity, based on a "holistic" approach to learning. It included a computer science class, writing laboratory, and a mathematics laboratory. The goal of the program was that students, upon completing it, would view mathematics, writing, and computer knowledge as tools for everyday life. A similar program to the one described here is also conducted for MESA senior high school students.

General Information. Students from participating school sites of the East Bay MESA Center (and some students from non-MESA sites) applied for the summer program, and 58 enrolled, primarily Black students, but also some Hispanics and a few other minority students. Students were selected on the basis of grade point average, MESA participation during the academic year, teacher recommendations, and desire to attend. The program was held over a four-week period, four hours per day, at Claremont Middle School in Berkeley, which was centrally located for all students and which loaned computer facilities for the program's use. For two hours daily, students took the Mathematics Laboratory and Writing Workshop, team-taught by a mathematics and an English instructor, which focused on incorporating reading and writing skills in solving mathematics problems. The BASIC Programming and Word Processing class, held the other two hours, was closely coordinated with the Math and Writing Lab and focused on an introduction to word processing and BASIC programming skills. Word processing assignments were taken from the writing laboratory, and the programming final project was a graphics program that displayed a garden with butterflies and birds flying across nodding flowers. Peer tutors, one in each class, were used in the computer part of the program. On Wednesdays, students participated in career awareness workshops held at the UC Berkeley campus for senior high MESA students. Parents met with instructors and staff twice during the program. A final awards ceremony capped the four-week session.

Activities. Computer activities were programming, including graphics, and word processing. Students worked at computers in pairs, and there was some one-to-one peer tutoring as part of the computer lab program.

Equipment and Software. The middle school's computer lab consisted of 15 computers. Software used included BASIC programming language and a word processor.

Program Results. Results from a survey of student participants showed that students were enthusiastic about the program, and the level of assigned work was appropriate for these students. Out of the 58 enrolling in the program, 56 completed it, indicating a high degree of success and motivation among students overall. The peer tutors were reported to be extremely effective

and patient in explaining concepts on a one-to-one basis.

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Program Description. The main computer program at McDermitt is the 3-8 Math Tutorial Program targeted to all 126 students in grades three through eight. The total school serves an isolated rural student population of 264 in grades K-12, including 52% Native American students and 9% Hispanic students. The goals and objectives of the tutorial program are to (a) get all teachers and students to use computers; (b) utilize the computer as a tool to enhance classroom learning; and (c) provide maximum possible quality, hands-on computer time for all students in the school. McDermitt also uses computers in several other areas of the school's program as described below.

General Information. The math tutorial program was developed in response to the school receiving seven computers and Indian Education math funds from the state for software and training. In developing the school's program, the focus was first on training all teachers to use the computer and software and to make lesson plans that included the computer as a classroom instructional tool. This was accomplished by having all teachers preview and evaluate software. By involving all teachers in software selection, the computer was then used in a wide range of disciplines. The resulting high degree of teacher enthusiasm and the selected software formed the basis of the school's computer program.

The tutorial program is specifically aimed at all students in grades three through eight and as many as possible from other grade levels. Computer uses include CAI and problem solving. The school received the computers in mid-October 1982. Teacher training occurred in January 1983, and implementation for students began in mid-February 1983. Initially, teachers arranged their own computer time, but a computer room specialist was added and computer time became centrally coordinated so that there is little computer downtime. The computer specialist has developed an extensive management and record-keeping system. The computer tutorial program has expanded to include reading and language activities. Computers are also used in the Chapter I programs (elementary and secondary), history, social studies, journalism, and business classes, as well as an introductory Computer Science class. The Chapter I programs use reading diagnostics and word processing for creative writing; the journalism class uses the computer to produce the school newspaper; a history class uses word processing for special research reports; social studies classes use simulations; the business department uses word processing, keyboarding, and accounting software; and the computer science class provides an introduction to programming. In addition, an after-school 4-H group focuses on programming and problem solving.

Activities: Activities include programming, problem solving, simulations, word processing, spreadsheets, and accessing databases for classroom research. CAI in math, reading, spelling, history, science, and geography is also offered, as well as diagnostics in math, reading, and record-keeping. Students typically work at computers individually or in pairs and occasionally in groups of three or more for a few programs requiring such an arrangement.

Equipment and Software. Software in use includes programs from MECC, Milliken, Hartley, Spelling Bee games, Aquarius, Learning Company, Sunburst, Microzine, and others. Other software considered effective are Community Search, Oregon Trail, Reading Style Inventory (diagnostics), and Print Shop (which is highly prized and used by both teachers and students). There are now a total of 10 computers in place in the computer lab. There are 6 computers in the business lab, one in each of the Chapter I classrooms, and a new one in the school office.

Results. Improved attendance, enthusiasm, attitude toward learning, and higher level thinking skills were reported. The program coordinators feel that improvement will begin to show in SAT scores. Visits from the State Department of Education have resulted in the program being suggested as a model for other communities. Program success has led to the involvement of the program coordinators in state computer curriculum development activities and teacher training conferences. Other stated benefits include: more computers in homes (including those of half of the 22 teachers) and businesses; parents taking night computer classes; student use of word processing in homework and class reports; 4-H computer classes; increased parent demand for more computer classes for themselves as well as students; and use of computers in preparation for PSAT, SAT, and GRE exams.

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Program Description. The Computer Science program at McKinley is targeted to rural high school students. Twenty-nine percent of the school population is Native American; nineteen percent is Hispanic. The program's goals and objectives are to (a) expose all students to computer literacy; (b) give the majority of students the opportunity to learn at least one programming language; and (c) give all students the opportunity to use the computer as a tool for inquiry, problem solving, and recreation using electronic research, simulations, word processing, experiments with monitoring and control programs, and prepared programs in accounting, data entry, and spreadsheets.

General Information. The program was designed for all students in the rural Northern Humboldt Union High School District, a district with large numbers of Native Americans, many Mexican Americans and Portuguese Americans, and a sprinkling of other minorities.

All freshman students are targeted for the program and encouraged to enroll. Between 79% and 89% of all freshmen are enrolled in the class; at least 50% of the students participating are female. The program began in 1980-81 with one computer and has since expanded to 35 computers, with computer work included in every business and computer science class.

The curriculum includes a brief introduction to computers in all typing classes, year-long courses in structured programming in BASIC, word processing, and an advanced placement course in Pascal. In addition, the school offers experience in computerized accounting and in the student store. The overall program is considered a four-year program, offering computer awareness in the ninth grade, word processing in tenth grade, BASIC programming in the junior year, and Pascal in the senior year for advanced students. There is also an opportunity for advanced students to undertake independent study in their interest areas (e.g., Cobol, machine language, and graphics).

Activities. Program activities include programming, problem solving, simulations, word processing, spreadsheets, and financial software. Students typically work individually at computers, but also work frequently in pairs and occasionally in groups of four or more.

Equipment and Software. Software in use includes Super Scribes, Pascal 80, BASIC, Typing Units, Southwestern Accounting Computer Programming, and Practice Sets. The school now has 35 computers: there is a computer for each student while in the class.

Results. Students were shown to have developed (1) a heavy utilization of word processing, as indicated by students doing their English papers in the computer lab; (2) logical thinking skills, as indicated by success in math and in tests; and (3) basic job skills, as indicated by jobs obtained. The program is considered a success in terms of enrollment, as a high percentage of the student body continues to enroll in computer classes.

Implementation Factors. The entire Computer Science department was involved in all phases of planning and implementing the program.

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Program Description. The Computers in All Classrooms program at Mendocino is targeted to high school students in a rural setting. The goals and objectives of the program are to (a) install computers in all core classrooms; (b) train teachers in the use and applications of computers and advanced software; (c) integrate computers into required core curricula; and (d) provide all ninth- through twelfth-grade students with daily use of computers and advanced software.

General Information. Mendocino High School has 320 students. Teachers in grades 9-12, students, SIP representatives, Vocational Education Committee members, and Computer Curriculum Committee members determined the need to integrate computers into core classes. They also planned and designed the program. Computers in classroom settings began in 1979 in the Special Education classrooms. Integration of computers into other courses began in 1983. The use of word processing, database management, and spreadsheet programming will become a part of the Math and English curricula by June 1986. Ultimately, computers will be integrated into all core classrooms to help students develop a greater awareness of their applications in various disciplines. Since this is a long-range goal, it helped to begin with fewer departments and disciplines and to concentrate on more equitable access and curriculum development one department at a time. Students have also been encouraged to participate in computer elective courses.

Activities. Activities include programming, problem solving, simulations, word processing, spreadsheets and other financial software database software. Students most often work individually at the computers in classrooms, but sometimes work in pairs and occasionally in groups of three.

Equipment and Software. Software in use at the school includes Bank Street Writer, Homeward, Apple Works, Super View, Wordstar/Memword, Supercalc, and DBase II. The student-to-computer ratio is seven to one.

Results. Teachers observe that students have (a) developed positive attitudes toward use of computers; (b) developed computer skills (i.e., operation, programming, and repair); and (c) used computers as tools for solving problems. Expanded use of the computer program since it was first established has produced (a) more student use of computers; (b) more computers in classrooms; (c) more use of advanced software; and (d) greater use of the computer as a tool for classroom instruction. Students and staff have greater acceptance, awareness, and use of computers as classroom tools for solving problems and thinking critically.

Implementation Factors. Factors that contributed to the success of the program include (a) staff interest, desire, and willingness to participate; (b) administrative support and interest; (c) grant funds; and (d) close coordination among high school and ROC computer staff.

Staff discomfort with computers was solved by additional inservice programs, and a computer access problem was solved by additional grant funds obtained for more computers in the classrooms.

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Program Description. One of the computer programs at Fremont is called Database: A Tool for Social Studies and is a World Studies course developed for low-achieving ninth graders. It is one of many courses offered in a large high school in a middle class suburban community and is held in a computer applications lab.

General Information. A selected group of low-achieving students spends one to two days a week in the lab using the computers as problem solving tools for learning World Studies. The students build a database that contains fields involving countries, demographic information and selected data on natural resources, import-exports, etc. taken from the textbook and library research skill sheets.

Activities. The students meet in small groups to collect data, decide what is to be entered and work in teams to enter the data. When the students reach the case study of geographic regions portions in the textbook, they will be querying the database to solve problems. Cooperative learning teaching strategies are used and students learn terms, concepts, ordering, categorization and logic while they build a cross reference for future work.

Equipment and Software. The lab has 10 computers and three printers. Database software is used in this course.

Results. The students gain skills in clearly expressing their ideas and developing a logical approach to problem solving.

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Program Description. The Computer Education program at Mount Shasta is targeted to rural high school students. The goals and objectives of the program are to teach students how to operate a computer and use the computer as a tool for productivity. Information from the district says, "It is recognized that there is ample drill & practice software available. However, it is the philosophy of the district that the most beneficial uses of computers will be where the computer is used to turn on the students' critical thinking skills and the computers allow application software to help shape the students' understanding of any given problem."

General Information. Computer courses comprise (a) a one-semester course in Computer Education, available to all students in grades 9-12 as an elective; (b) a one-year course in Business Computing, open to students in grades 10-12; and (c) a one-year course in Advanced Computer Science, available to all students in grades 10-12 who pass Computer Education with a "C" or better. A second-year course in Advanced Computer Science is available for AP students.

A computer course has been a regular part of the curriculum since the Fall of 1983. It began as an elective signup with 36 students. At that time, it consisted of a small computer lab during the regular day. Since 1983, other computer courses have been added: Advanced Computer Science, Word Processing (typing II, E.H., and English).

Attempts to integrate computers into all curricular areas are expanding each day. At present, computers are employed in Business, Math, Science, Home Economics, English, Foreign Language, and Educationally Handicapped classes. English courses expose all students to word processing; special projects or units are included in various Math, Science, Home Economics, and Foreign Language classes that use the computer to enhance learning.

Educationally handicapped students are provided with a computer to enrich their studies and supplement weak areas. Word processing is used to do papers for other subject areas.

Activities. Program activities include programming, problem solving, simulations, word processing, spreadsheets, database software, using modems for telecommunications, and accessing databases for classroom research. Students work individually most of the time, but also work in pairs at computers.

Equipment and Software. Applications used at Mount Shasta include software for word processing, database, simulation, analysis (dictionary), and programming. There is one computer for every 15.2 students.

Results. An evaluation of the program was conducted through the University of California at Davis field experience program. Greater student acceptance of computers was observed by teachers.

The program has expanded since it was first established. Computers are now used in more curriculum areas, and teachers use computers for word processing, graphics generation, and for keeping grade records.

Interest is also growing in other areas of the curriculum such as Industrial Arts, Social Studies, and Physical Education. An effort has been made to educate teachers about the benefits of computer education.

Implementation Factors. The Western Association of Schools and Colleges helped the school identify the need for computers. The instructor initiated the program by opening courses in computer education. English teachers then added computers to their curriculum. University of California at Davis had courses that helped target the needs, design, and goals of the program. Funds from AB551 allowed school planning and the initial implementation.

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NEWCOMER HIGH SCHOOL

SAN FRANCISCO, CALIFORNIA

Program Description. Newcomer High School was created in 1979 with the purpose of providing a transitional educational program for foreign-born high school-age (14-17) students who do not have adequate fluency in English. These high school studies are providing intensive instruction in English as a Second Language and bilingual support subject classes such as Social Studies, Math and some electives that maintain continued acquisition of basic academic skills and concepts. In the bilingual support classes, the student's primary language as well as English is used. Enrollment varies, but averages 400 students.

General Information. Students can remain at Newcomer High School for a maximum of one year. It is expected that with one year of intensive orientation to American culture, society, and the English language, the average student will be able to make a smooth transition to his or her assigned district high school or a suitable vocational or community college program.

Computers are used in a resource/language lab, in the Math program, in the Business Skills classes, and as part of the Library/Media program. Instruction is offered to every student in grades 9 and 10 for at least 30 minutes a day as part of the English program.

In the library/media center, computers are available in an open-lab situation. The computers have become a social center, with some youngsters spending a great deal of their free time with the computers. The school is linked by modem with another school in the city, an all-English-speaking private girls high school. The girls in the private school act as "on-line" tutors to their computer "pen-pals" at Newcomer.

Activities. Program activities include word processing, programming in BASIC or Logo, database manipulation, and the use of modems for communications. Students work mostly in pairs at computers, but sometimes they work alone.

Equipment and Software. Software in use includes Appleworks, Bank Street Writer, and Logo. There are 12 computers with modems for 400 students.

Results. The results of the program as observed by the teachers are high student interest and increased self-confidence, high levels of verbal interaction around programming and word processing tasks, and increased writing skills. It is difficult, however, to separate the use of computers from the rest of the school program.

Implementation Factors. Key factors in the success of the program have included a focus on teacher training, the support of the principal as well as colleagues, and the mentor teacher project. Problems that needed to be dealt with include an insufficient number of computers and a lack of teacher experience, knowledge, and comfort: the teacher training focus, as well as the mentor teacher and principal support have thus been valuable.

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NORTH COAST HIGH SCHOOL

FORT BRAGG, CALIFORNIA

Program Description. The Computer Vocational program at North Coast is targeted to continuation high school students (grades 9 through 12). The goals and objectives of the program are to give every student the opportunity to (a) use special function keys and demonstrate touch typing (skills will be measured by pre- and post-testing); (b) use word processing for some assignments or projects and state its advantages (skills will be measured by the student being able to complete an assignment using the word processor); (c) use databases and then be able to contrast use with manual methods (evaluation based on the strength of a demonstration made to the instructor by each student); (d) use electronic spreadsheets and then be able to contrast with manual methods (evaluation based on the strength of a demonstration made to the instructor by each student); and (e) use a computer design and graphics program (evaluation based on completion of an assignment and a demonstration by each student to the instructor).

General Information. North Coast High School is a continuation high school of 90 students. The educational needs are vocational rather than academic; more than 90% of graduates move directly into the workforce after leaving school.

In the Fall of 1984, the district office assembled a representative group to write a plan for computer education reflecting local needs. The plan ensures equal access to all students in the district regardless of race, sex, religion, or handicap and was adopted by the local school board in November. It specifies that all students be made aware of computers, become computer literate, and have an opportunity to use computers and apply what the students have learned in a variety of educational settings.

A needs assessment was conducted at the school among 16- to 18-year-old students using the Career Occupational Preference System and the Strong-Campbell Interest Inventory. Of the students tested, 57% indicated a preference or a strong interest in office occupations and closely related fields.

A set of objectives reflecting these needs was established (see above). Four courses were designed: (1) Computer Operation and Computer Awareness; (2) Consumer Economics; (3) Budgeting; and (4) Word Processing. These are taught by the school staff.

In addition, the Fort Bragg center of the Regional Occupation Program has agreed to teach office occupation classes on the subjects of (a) computer keyboarding; (b) database management; (c) use of electronic spreadsheets; and (d) computer-assisted design. Since each student works on an individual contract basis, the computer plan is built into each student's program.

Activities. Program activities are concerned with (a) basic computer operation and computer awareness; (b) consumer economics; (c) budgets; (d) use of word processing for written assignments; (e) office occupations (computer keyboarding, database management, use of electronic spreadsheets, and computer-assisted design).

Equipment and Software. Business application software and word processing software for school work are used. There are four to six computers and printers arrayed in an office-like configuration. To implement the vocationally oriented program, two computers in a package called "Administrator's Office" plus one additional computer were purchased. Along with computer tables and chairs, wiring, software, and an existing computer, an "office lab" was established. The office lab is expanded occasionally with two additional computers, increasing the range of training possibilities. This equipment comes from the Regional Occupational Program on a rotating basis.

Results. As the program is now in the initial stages of implementation, no evaluation results are available.

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ORO LOMA ELEMENTARY SCHOOL

FIREBAUGH, CALIFORNIA

Program Description. The Oro Loma computer program described below is targeted to rural, low-income, and Hispanic elementary students. The goals and objectives of the program are to (a) give all students a chance to use a computer; (b) familiarize students with the keyboard; (c) use math programs; and (d) build a library of software appropriate to each teacher's needs (for students).

General Information. Oro Loma is a single-school elementary school district in Fresno County serving about 200 students, 75% of whom are Hispanic. In 1980, the school acquired two computers and circulated them among classes on carts. This was not effective in providing equal access, so, in 1982, a lab with 8 computers was set up. Students in all classes now go to the computer lab twice a week for 30 minutes; ESL students are provided with an additional 60 minutes. The lab is staffed by a bilingual aide; software is selected by teachers to support ongoing curricula.

Activities. Students use programming, simulations, word processing, and early learning software. Students work in pairs at the computer.

Equipment and Software. There are nine computers in the lab, one in the library for record-keeping, one voice box, and one printer. Early Education materials, two word processing programs, one word processing program that talks, and many public domain materials from MECC are used.

Results. Students have become more open toward computers. To date, primary benefits are familiarization with keyboard and computer. Teacher involvement has increased, with a sponsoring corporation's help.

Implementation Factors. The County School Library has purchased available MECC materials to satisfy software needs, but more equipment is needed; teachers need more time to explore the equipment. The principal has been very supportive, and the addition of an aide to run the computer lab has contributed to the program's success.

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Program Description. The Peer Teaching With Computers on Wheels program at Revere is targeted to minority, ESL, and educationally disadvantaged students in second through fifth grades. The goals and objectives of the program are to (a) put the child in charge of the computer; (b) teach beginning computer using skills and applications; (c) raise student self-image; (d) integrate the computer into individual classroom curriculum; and (e) provide minority, disadvantaged inner-city children access to computers.

General Information. Computers on Wheels is a library-based program that uses peer training to integrate the use of computers in on-going classroom activities. The program has a unique form: On Mondays, one third of the students (8 to 14) from each classroom, grades 2 through 6, receive a 40-minute lesson on the computer. Students are rotated through the computer lessons so that each student has a lesson in the computer lab once every three weeks. Following the Monday lessons, the computers are moved on carts from the lab into classrooms. The computers are then used during the week for whatever purposes are important to the classrooms, with the students who have been trained on Monday serving as tutors for their peers. On the following Monday, the computers "roll" back to the library for another training session. Every three weeks, then, each student has a chance to be trained on the computer and become a tutor for his or her peers.

The program was initiated by the school librarian, who solicited help from the Far West Laboratory staff and her own peers.

Activities. Program activities include programming, problem-solving, simulations, word processing, database, models, graphics, and Logo. All activities are tied to classroom curricula. Students work at the computers mostly in pairs, but sometimes they also work individually or in groups of threes or fours.

Equipment and Software. Software programs in use include Atari and Apple Logos, Atari Writer, Magic Slate, Print Shop, Newsroom, Incredible Lab, Atari Lab, and Temperature Light Probe Koala Pad. There are 18 microcomputers for 275 students, a ratio of about one computer for every fifteen students.

Results. So far, teachers report a wonderful attitude toward and an eagerness to participate in the computer program. No formal evaluation has been conducted, but teachers have observed that students want to write, they never miss their turns on the computer, and they teach their teachers.

Implementation Factors. A computer curriculum is developing on which each classroom teacher can build related computer applications that integrate the computer with the class curriculum. Lack of equipment was a problem in the beginning, but the librarian who initiated and implemented the program has received funding for additional computers and equipment through four separate grants.

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PENINSULA ACADEMIES

REDWOOD CITY, CALIFORNIA

Program Description. The Peninsula Academies program consists of two "schools within schools" in the Sequoia Union High School District that target disadvantaged students of various ethnicities (most are Whites, Blacks, Hispanics, and Asians, with a few Pacific Islanders) and both females and males in grades 10-12 who are school dropouts or unsuccessful in a regular school program. Specifically, target students exhibit three or more of the following characteristics: (a) economically or educationally disadvantaged; (b) underachieving; (c) irregular attendance; (d) low motivation or interest in the regular academic program; and (e) interest in the Academies. Program goals and objectives are to (a) serve disadvantaged/minority students not successful in regular school program and/or dropouts, (b) meet vocational needs of such students and partially meet employers' needs for skilled and semi-skilled employees, (c) confront unemployment among target students; and (d) establish a model program for use elsewhere.

General Information. Program planning began in 1979, with implementation in 1981-82 as a partnership between Sequoia Union H.S.D., Stanford Mid-Peninsula Urban Coalition, and private industry. The Urban Coalition served a catalytic and coordinating role, but shifted day-to-day operation to the school district as the program became more established after two years.

The program includes a Computer Academy and Electronics Academy, each at a different high school in the district. The curriculum and instruction focuses on technical training (computer technology or electronics); basic academic skills; and job preparedness skills. English, math, and science classes are specially tailored to the computer and vocational fields. Key components of both academies include mentor relationships between 11th-grade students and industry employees and work experience for juniors and seniors.

In the Computer Academy, the curriculum at all grade levels (10, 11, and 12) focuses on an introduction to computers and data processing; programming and computer operations; computer applications; and career opportunities and job requirements. Computer applications and BASIC programming are increasingly emphasized during the 11th grade, when the course also includes a mentor program and summer job program, both in conjunction with local business and industrial firms that help sponsor the program. Twelfth graders focus on a variety of microcomputer business software, applications (word processing, database, accounting, and financial planning), and a survey of programming languages; they are placed in part-time jobs during their last semester.

Activities. Computer activities include programming, problem solving, word processing, spreadsheets, other financial software, and data base software. Students typically work at computers in pairs, but they also frequently work individually and occasionally in groups of three or more.

Equipment and Software. There are 10 computers for about 20 students per class. Various applications and business/financial software are used.

Program Results. A complete evaluation of the program was conducted by the American Institutes for Research (A.I.R.). Compared with a group of similar students in the traditional school program, the academies resulted in: (a) positive effects on students' self-esteem, attitudes toward school, and career planning abilities; (b) improved school performance including lower absenteeism, more school credits, equal or higher grades, better proficiency test performance, and lower school dropout rate; and (c) a higher rate of working or postsecondary schooling and higher salaries following graduation. The Academies program was chosen as an exemplary project in educational technology by the State of California, which provided planning grants to ten additional school districts in the state in 1985 to replicate the program.

Implementation Factors. Factors considered to be keys to program success are: the school-within-a-school format that has created an extraordinary esprit among staff and students; the job placement and mentor aspects of the program; and close contact with parents. Coordination and implementation problems occurred the first year (1981-82), but by the end of the third year, program management was successful in establishing a working partnership with private industry, including over 40 participating companies. Early problems included poor communications with industry; teaching staff turnover; higher student attrition than expected; out-of-date equipment; lack of focus in computer technology curriculum; lack of interaction on the part of some student-mentor pairs; lack of parent involvement; and difficulty locating part-time job experiences.

The second and third years saw resolution of most of these problems, with: an increase from 6 to over 40 participating companies; development of technical and academic curricula to meet the needs of target students; small class sizes, allowing individual staff-student interaction; enlistment of a large number of mentors; and addition of sufficient summer jobs and part-time work experience opportunities.

Local industry donated equipment for both Academies and provided management committee members, loaned instructors, mentors, and money. The district provided space, instructional materials, academic teachers, and administrative support. Start-up grants were provided by eight foundations.

Program Materials Available. A Final Technical Evaluation Report and a Replication Guide by A.I.R. provide complete information about the program.

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PHILLIP BURTON ACADEMIC HIGH SCHOOL

SAN FRANCISCO, CALIFORNIA

Program Description. The computer program at Burton is targeted to Black and Asian minority students, and both females and males at the ninth- through twelfth-grade level. The goals and objectives of the programs are for students to (a) participate in a learning environment that is characterized by interdependence and cultural diversity; (b) improve critical thinking and problem solving skills through learning Pascal; and (c) learn to use the computer as a tool. An adult computer program is also offered in the evenings, with the objectives of developing (a) parent computer awareness, (b) fellowship among parents, and (c) parent involvement with their children.

General Information. A consent decree entered into by the National Association for the Advancement of Colored People, the California State Department of Education, and the San Francisco Unified School District has as its basic goal the improvement of integration throughout all of the public schools in San Francisco. Part of the agreement places major emphasis on the improvement of the quality of educational services in four selected schools, including Phillip Burton Academic High School, in order to attract youngsters from various racial/ethnic groups. The improvement of instructional programs at these sites is perceived as a primary vehicle for achieving the goal of improved integration and includes a sizeable infusion of computers into the curricula, providing access to computers for school populations that are predominantly minority. These schools operate under a clearly articulated set of eleven basic goals or tenets. One goal is that all children can learn: a number of the proposed ways that this tenet is to be implemented is through the use of computers. For instance, all high school students will be expected to learn the Pascal programming language in order to improve critical thinking and problem solving skills. As students increase their computer proficiency, the academic courses will add planned activities that require the use of the computer as a problem-solving tool.

Although Phillip Burton has high expectations for its students, it has no academic entrance requirements. Students from all parts of the city are encouraged to apply. All high school aged students have equal access to the school and to its highly developed computer program.

All ninth-grade students at Burton take a course on the use of the computer as a tool. They learn to use word processing, to program in Logo, and are introduced to BASIC. All tenth graders take a full year of Pascal. An eleventh-grade one semester class deals with applications of the computer to subject matter in other courses: students learn to use spread sheet and data management software, how to conduct a survey using the computer, and how to use an outlining software package to organize their thinking. Eleventh graders also take one semester of college entrance exam preparation. Since both the program and the school are new, there are currently no twelfth graders. As the juniors move into their senior year, a course will be planned, based on the experience of both students and staff.

Part of the school's commitment to excellence is attention to parent education, and therefore an evening computer class is provided for parents, using word processing software and creative writing curricula from the Bay Area Writers Project.

Activities. Computer activities include programming, problem solving, word processing, spreadsheets, and use of database software: no drill-and-practice is used. Students may work individually at the computers, but the teachers ask that they begin work on problems as teams of two. There is a great deal of verbal interaction in the lab, often with two students at one computer while other computers stand empty. Students also work together around tables, writing programs and plans on paper before beginning on the computer. At each computer in the microcomputer room, students find a dictionary and word processing manual. Disk operating system diskettes and other software are checked out by students in a simple library system as they need them.

Equipment and Software. Software in use provides for word processing, spreadsheet, database management, and outlining, and Pascal, BASIC, and Logo programming. Some of the specific software in use includes Writing Assistant, Graphing Assistant, and ThinkTank. The school has two computer labs: one has a large mainframe computer networked to 36 work stations, and the other has 44 microcomputers with graphics capability, along with letter-quality printers.

Results. So far, program success is measured by student success in meeting course requirements. Informal observations of student involvement and levels of competence indicate a great deal of success. Many parents are finding the evening class to be the major event of their week! Social ties are made and work skills are developed. Increases in self-esteem have been observed, especially among the Black population participating.

Implementation Factors. Implementation problems have arisen mostly from equipment concerns, especially with the networked mainframe computer, and a paucity of available software for that system.

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Program Description. The Computer Literacy--Eighth-Grade Level program at Quincy is targeted to eighth-grade students in a rural setting. The main goal is to familiarize students with database, word processing, and spreadsheet operations. The course description also includes construction of simple graphics programs in BASIC and in LOGO. Other objectives are to (a) define terms commonly used in the use of personal computers; (b) trace major events in the historical development of computers; (c) recognize the differences between ethical and unethical uses of the computer and computer software; (d) demonstrate ability to load, run, and save programs on a floppy disk; and (e) recognize computer peripherals and their uses.

General Information. The program is an elective introductory course. There are 22 students in the computer program, and all have had little or no computer experience. The class is open to "special needs" students in Special Education, as well as all other students. The instructor requires the class to be 50% female. The principal determined the need for the program, and the teacher planned and designed it. The principal and teacher together initiated the program and made it a regular part of the school's offerings. The program began in 1984-85 as a pilot program with 22 students. In 1986-87 the program was expanded to include all eighth-graders.

Activities. Students' activities include programming, problem solving, word processing, spreadsheets, and using database software. Students work primarily in pairs.

Equipment and Software. Software programs in use include Appleworks, Printshop, Bank Street Writer, Math Blaster, and Logo. There is one computer for every pair of students.

Results. An evaluation is to be completed by June 1986. The program is still in its infancy, but growing. The teacher is gaining necessary skills at a fairly slow pace because of the isolation and distance from universities offering computer education for teachers.

Implementation Factors. The following three factors have contributed to the success of the program: (1) ECIA funds and a state grant; (2) enthusiasm of the instructor; and (3) a desire for the computer class by students.

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RIVER CITY SENIOR HIGH SCHOOL

WEST SACRAMENTO, CALIFORNIA

Program Description. River City uses computers in a number of different programs targeted to their population of low-income, low-achieving, and Hispanic, Black, and Asian minority students. Their goals are to (a) integrate computer use into all curricular areas; (b) provide access to computers for all students; and (c) teach students to use the computer as a tool so that they can work in new and more productive ways.

General Information. River City High School is located in the predominantly Hispanic Port of Sacramento, an area of low income and low educational attainment in greater Sacramento. The school's population is 64% white, 30% Hispanic, 5% Black, and 1% Asian (mostly immigrants). Sixty-four percent of the students score below the 50th percentile on the CTBS in reading. There are several computer education programs at the school: Computers in Language Arts; a business computer lab; a computer science program; an informal "Lunch Bunch"; and uses in other curricular areas. Descriptions of these programs follow.

The Computers in Language Arts program was begun in 1981 by the reading specialist as a result of computer demonstrations at the California Reading Association Annual Conference. There are four computers in the learning center that are used for record-keeping and instruction, including word processing and CAI software in Reading and Language Arts. The Computer Managed Instruction record-keeping program allows the reading specialist to work with 80 to 90 students in the program.

The reading specialist has also set up a program to provide a friendly drop-in place for students as well as an environment for computer access (the "lunch bunch"). He spends the lunch period in the lab and sets out a file box of software disks, such as math games, for students to use. Mostly male and Hispanic students participate, but there are Hispanic and Cambodian students working together; girls come in to make computer banners, and LEP students often come. A core group of 15-20 students is in the "lunch bunch" on a given day. An extension of this program occurs in the morning when the aide arrives a half-hour early.

Through Vocational Education and district funding, a business computer lab was established. A variety of business-oriented software is used, including word processing, accounting, and spreadsheets. More girls than boys take these classes, making them important for increasing females' access. Three periods of programming classes in Computer Science are taught to a cross-section of students. In fact, there tend to be higher percentages of girls and minority students in these classes than in the general school population. Students must pass a school proficiency exam to take the programming classes; however, most students have no difficulty doing so.

Computers are also used in other curricular areas. The reading specialist said "[computers] are used all over the place." A math lab provides CAI. When it began 3-4 years ago, this program was more drill-and-practice, but now

there is more emphasis on thinking skills through problem-solving software. Databases are used in Social Science classes, and computers are used in Journalism for producing the newspaper. Computers have been used in Home Economics for five years for shopping ads, prices, and shopping lists.

Activities. Computer activities in the various programs at River City include programming, problem solving, simulations, word processing, spreadsheets, financial software, database software, accessing databases for classroom research, some CAI in Math and Language Arts; record-keeping for instructional management; and learning games in the "lunch bunch."

Equipment and Software. Hardware consists of 4 computers in the Language Arts program and 20 computers in the business lab. Software considered effective in the Language Arts program include Computerized Management System, Appleworks integrated software, MECC software materials in Reading and Language Arts as well as teacher utilities, Milliken spelling software, Academic Skill Builders in Language Arts, Newberry Winners, and other software focusing on thinking skills. Public domain software from Softswap and CUE have also been considered effective.

Results. In the Language Arts program, the teacher has observed that students who are reluctant to write on paper will write using the computer. Students revise work more--an average of three times, but as many as 11 times. The computer-managed instruction program has provided efficiency and time savings in record keeping, increasing the teacher's student contact time, allowing the reading specialist to work with 80 to 90 students, as opposed to 40 students in reading programs for low-achieving students at other schools. Another observed outcome is that students have more control over the computer compared to other learning media. The computer has encouraged task-related and social interactions among students in different ethnic groups ("lunch bunch"). Some students from programming classes have gone on to full-time computer-related jobs; a low-income student has gone on to a Computer Science major at a University of California campus, and several other students have taken programming classes at the community college.

Implementation Factors. A major challenge has been obtaining funding for purchasing and maintaining needed hardware. The reading specialist has put together funding from VEA (vocational education), SCE (State Compensatory Education), a CTA grant, and a private company.

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ST. JOHN URSULINE SCHOOL FOR GIRLS

SAN FRANCISCO, CALIFORNIA

Program Description. The Computer Education program at St. John's is targeted to female, minority, and ESL high school students. The goals and objectives are to (a) provide a nonthreatening computer environment for girls; (b) develop computer literacy for all students; and (c) develop computer-related business skills.

General Information. St. John's is a parochial high school for girls, located in the Mission district of San Francisco. Of a student body of 290 students, 90% are college-bound. The majority of students are either Black or Hispanic. The school draws students from all parts of the city.

The use of computers in the school began in 1980 under the direction of the principal. With the help of a math teacher, the use of computers became part of the math department, with a single computer on a mobile cart. Both the Principal and the Math teacher left the school, however, and the responsibility for computer education was taken over in 1981 by a highly skilled and very interested business teacher whose qualifications included attitudes, knowledge, and skills from previous business experience, as well as graduate-level course work in programming and computer education.

Over the past few years, the numbers of computers has grown as funding from outside sources has been obtained, primarily through teacher-written grant proposals. The infusion of computers in other content areas has not yet occurred, but a recent addition of an easy-to-use computer in the school office has attracted the attention of an English teacher, helped relieve her technical concerns, and shown her how very useful computers can be in the writing process. A goal of the computer teacher is to get the English department to use computers as part of their program.

Except for one computer in the school office, all ten of the school's computers are located in a lab, which is a small area partitioned off from a larger classroom. The classroom had originally been the Home Economics classroom and, initially, the computer program shared the space with the sewing program. Only in its fifth year of development did Home Economics move to another classroom, allowing the computer program to develop in its own space.

The teacher offers seven courses, which range from college-level programming in BASIC, to business uses of computers and computer literacy. All students are required to take one quarter of computer literacy in the junior year, although sophomores may also elect to take the course. Algebra is required for admittance to the programming courses.

Activities. Program activities include word processing, programming, spreadsheets, and accounting. Students usually work in pairs at the computer, but occasionally work alone or in groups of three.

Equipment and Software. Hardware in use comprises ten computers and three printers, including a daisy-wheel printer and a graphics printer. Software packages used include BASIC Word Processing for Beginners, Bank Street Writer, Wordstar, Easywriter, PFS Write, Recordkeeping (part of R.C. Lassell and D.R. Van Alstyne, Recordkeeping, a text book with software for accounting published by Houghton Mifflin Co, 1982).

Results. The teacher reports that students in bookkeeping classes have become very excited about the course, and with the help of the software and activity book, are able to pace themselves, moving ahead as they are ready. The teacher sees students who in the past have been very passive about their schoolwork becoming much more interested.

Over all, the number of classes offered has expanded with each year of the program and seems limited now only by equipment and classroom space. Growth of enrollment in computer classes greatly outpaces the growth of the student population in general.

Owing to ease of use of one of the ten computers at St. John's, some teachers who were previously apprehensive about or uninterested in computers have now developed an interest in the computer program and in computers in general.

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SALT LAKE COMMUNITY HIGH SCHOOL

SALT LAKE CITY, UTAH

Program Description. Two of the computer programs at Salt Lake Community High School are called Computer Literacy and BASIC Programming and are targeted to adults, high school dropouts, economically disadvantaged, and minorities. The student target group comprises 60% of the total school student population, which is 50% White, 4% Black, 24% Hispanic, 18% Asian, 3% Native American, and 1% Pacific Islanders. Approximately half are female, half male. Students are drawn from several programs and levels within the Salt Lake Community High School: an Alternative Junior High, an Alternative High School, an Adult High School, and an English as a Second Language Program. Goals and objectives of the programs include (a) preparing students to use and deal with computers in work and everyday life by offering simple programming in BASIC, problem solving, historical, social, and ethical issues related to computer use, evaluating software, and word processing (computer literacy); (b) preparing students to use a variety of BASIC programming statements and to apply the programming concepts using PFS software (Introduction to BASIC); and (c) preparing students to take the GRE, ACT, and SAT tests (classes offered in the evening).

General Information. The program began as a pilot project at Salt Lake Community High School in 1983 with 10 students. The program has now become a regular part of the school's curriculum, serving approximately 600 students during the day.

Four computer literacy classes, two word processing classes, and three BASIC programming classes are offered during each school day. All seven periods and lunch hour are busy. Usually 10-25 students attend each class. There are three computer teachers. Computer literacy, BASIC programming, and word processing are also offered four nights a week. The computer center is also used daily for remediation on an individual basis.

Activities. Program activities include computer programming, problem-solving, simulations, word processing, spreadsheets and other financial software, and database software. Most students work individually, but occasionally they work in pairs.

Equipment and Software. Software in use at the school includes PFS Plan, PFS Write, PFS File, Bankstreet Writer, Missing Links, Verb Viber, States and Traits, Railswest, and European Nations and Locations. Over 160 software programs are available and are used mainly for individualized remediation in various subject areas. The PFS programs are used as applications programs in the programming classes. Other materials available include Computer Literacy: A Hands-On Approach by Luehrmann and Peckham, Sunburst software, and Intermediate BASIC. Hardware includes 30 computers--26 in a lab and 4 on carts.

Results. No evaluation of the program has been conducted. However, teachers and administrators have observed that students have a positive attitude toward school. The computer coordinator has observed that ESL teachers are very enthusiastic about using the computer lab for their students. Tests given by teachers reveal that student achievement in math has increased.

Implementation Factors. Factors that have contributed to the success of the program are the open-entry, open-exit, and individualized instruction. The extensive software library has been a benefit. Based on these and other factors, the school has mandated that all teachers in the school become computer literate. Problems that were overcome in implementing the program were a shortage of computers, shortage of software, uncertainty about objectives, and a shortage of instructional materials. All were overcome by purchase of additional computers, software, and materials.

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SAN JOSE UNIFIED SCHOOL DISTRICT

SAN JOSE, CALIFORNIA

Program Description. A San Jose district-wide program includes four project schools and is called CALIBRE (Computer-Assisted Learning Innovations through Bilingual Resources and Education). The target group is secondary LEP students at the middle school and high school levels. Program goals and objectives are to (a) develop proficiency in English and improve basic skills among the 80% of Hispanic LEP students who are below grade level in basic skills achievement; (b) provide a comprehensive education to LEP students in other subject areas, including science and social studies; (c) make computer assisted instruction a permanent feature of the educational program at the project schools; (d) provide career exploration and vocational education to LEP students; and (e) increase self-esteem and decrease the dropout rate among target students.

General Information. The four target schools were selected because they had not previously been serviced by Title VII grants, but their numbers of LEP students had increased steadily to approximately 65% of the school population. The project has a duration of three years. Year one (1984-85) focused on planning, teacher training in CAI and bilingual education, and preparation of project materials. Years two and three (1985-86 and 1986-87) will focus on implementation with students and on material selection/development, including software.

The program is a comprehensive one, concentrating first on planning and on preparing teachers to implement the program. Then, in its implementation phase, it focuses on the entire curriculum and not just language and basic skills instruction: it will integrate bilingual instruction with all subjects. In addition, it will emphasize career- and self-awareness.

Activities. Activities include tasks in computer literacy, computer-assisted instruction in content areas, and word processing. Students typically work at computers in pairs, but occasionally they work individually.

Equipment and Software. Word processing software is used. The ratio of computers to students is one-to-two.

Results. Evaluation of the first year is in process and is not yet available.

Implementation Factors. An implementation problem reported is that the program staff has not found available software that meets the needs of LEP students in their primary language.

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SAN JUAN UNIFIED SCHOOL DISTRICT

CARMICHAEL, CALIFORNIA

Program Description. An elementary level, district-wide program in the San Juan School District is called Indian Education and is targeted to Native Americans in two groups: low achievers for remediation and high achievers for SAT preparation. The goals and objectives in Math involve problem-solving, operations, and concepts; in Language Arts, emphasis is on reading, writing, and spelling; Computer Literacy concentrates on power with new tools, self-confidence, and ease and comfort with technology; and in Higher Order Thinking Skills, students experience a safe place to make mistakes and examine them.

Specific Program objectives are: (a) by June 1986, between 30% and 84% (depending on schedule adopted) of the Indian student population will attend one six-week computer session as measured by attendance; (b) by June 1986, students participating will increase their knowledge by 60% on computer usage as measured by pre/post tests, OR (c) the students will increase their reading level on SORT by one month growth after six weeks and/or math score on WRAT by one month during the six-week period, OR (d) the students will increase their Indian cultural knowledge by 50%; and (e) parents will increase their knowledge of computers, thereby being more helpful to children regarding computers and software.

General Information. Beginning in October 1985, the Title IV program will conduct five six-week sessions on computer usage and knowledge. The sessions will consist of a minimum of one session a week to a maximum of two sessions each week for each grade level. The first session will be used to pretest math, reading, and general information on how the computer works. The second session will be on software that the student can choose: academic, Indian culture, or computer knowledge. The third, fourth, and fifth sessions and part of the sixth session will be on topics selected by students, according to their interests.

Nine students, selected on the basis of documented tribal ancestry, attended the first session. These students were pretested in October and will be posttested in May 1986.

The parents and Title IV staff conducted a Needs Assessment in June 1985, to determine needs of the students. According to the Needs Assessment, the answer to a budget problem and the problem of meeting the needs of students was computer instruction. Parents and administrators designed the program. An administrator and a teacher initiated the computer program; it has not yet become a part of the school's regular curriculum.

Activities. Activities include programming, problem solving, word processing, spreadsheets, and database software.

Equipment and Software. The program has six computers. Software used in the program includes Logo, Appleworks, and the following MECC programs: Oh Deer!, Early Addition, Elementary, Vol. I, Growgins Fractions, Guessing and Thinking, Mind Puzzles, Mouse in the Maze, The Friendly Computer, Multiplication Puzzles, and Quotient Quest.

Results. Neither formal nor informal evaluations of the program have yet been conducted.

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Program Description. Two computer programs at San Leandro are administered through a physics course and the Bulletin Board Club, which are targeted to female G.A.T.E. students, so that a balance of females and males would be maintained. In addition to these programs, an Introduction to Computers course was not specifically targeted to certain students, but females were actively recruited.

The goals of the courses and the Bulletin Board Club reflect the social concerns of the staff. Introduction to Computers is available to students who have passed district proficiency tests in math, reading, and writing. The goal of this course is to make students comfortable with computer technology and competent in the major uses of microcomputers in the home and in business through activities in word processing, database and spreadsheet programs, telecommunications, adventure games, Logo and structured BASIC programming, and problem-solving. The goals of the physics course (as it relates to computers) are to (a) view and use microcomputers as common tools for word processing and data analysis; (b) see value and limitations of the lab in simulations; and (c) use computers as instruments in the lab. The club was established to (a) involve a diverse group of students in a public service/educational activity; and (b) involve students in being in charge of an actual computer telecommunications system.

General Information. The school's total population population of 1,315 includes 20 % Hispanic, 16% Asian and Filipino, 6% Portuguese, and 3% Black. Fifty-three percent of the 224 students in the computer programs are male; forty-seven percent are female. San Leandro High School is successfully providing for 50-50 ratios of girls and boys in computer classes and activities, but only after a concerted effort on the part of a few key staff persons--the principal, the G.A.T.E. coordinator, and the head of the science department.

The use of computers began at San Leandro, as it has at many schools, in the math department, with instruction on programming--at San Leandro, programming in machine language. This focus effectively screened out girls and developed "ivory tower" attitudes about computers. The use of computers was essentially limited to "hackers."

On the retirement of the math teacher, the use of computers broadened into a new course, Introduction to Computers, an established physics course, and an extracurricular club that has established a bulletin board service. In all these groups females were actively recruited, counseled, and mentored to maintain an "ideal" 50%/50% male/female ratio in physics and computer science. Slightly more than 50% of enrollment is female. Club leadership roles are female, although most members are male.

Activities. Activities in Introduction to Computers include word processing, database management, spreadsheets, adventure games, and Logo and BASIC programming. Physics course activities include word processing (written lab reports), lab simulations (optics, orbits, waves, etc.), and data analysis. Activities of the Bulletin Board Club include operating the electronic bulletin board system (BBS) on site, CompuServe, the Well, and access for research. Students work in pairs.

Equipment and Software. There are 14 computers for every 28 students in the computer classes. Software for Introduction to Computers includes AppleWorks, InfoCom games, Terrapin Logo, Applesoft BASIC, and Beagle Brothers utilities. Software for the physics course includes AppleWorks, Vernier, Cross Education, and Sensible Speller. Software for the Bulletin Board Club includes Beagle Brothers utilities (D Code and Double-Take), Merline 6502 assembler, and Pascal 1.2.

Results. Yearly evaluation is conducted by the science department. Male/female enrollment, G.A.T.E. enrollment, and Club participation are evaluated. The female involvement is at a significant level and has been on target at 50%. Teachers have observed that students view computers as tools, use computers to do their school work, use the BBS for study sharing, and use more word processing for their assignments. In addition, teachers are now using word processing as well: several teachers have had students teach them. The level of both student and teacher participation has been rewarding.

Implementation Factors. Factors that have contributed to the success of the program include (1) a desire by key people to target a wide group and put special attention on female involvement; (2) continual follow-up with targeted students by checking enrollments and programs in classes; and (3) support by key staff of the concept of targeting females and emphasizing nonprogrammer use of computers. Some of the specific efforts in recruiting and mentoring females are described above.

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SIERRA MOUNTAIN HIGH SCHOOL

GRASS VALLEY, CALIFORNIA

Program Description. A computer program at Sierra Mountain is called the Learning Lab and is targeted to rural ninth- and tenth-grade students with a history of low motivation, low attendance in school, and low academic achievement. Students are screened for enrollment from a waiting list of students who have not thrived in the comprehensive high school and who wish to attend Sierra Mountain. Goals and objectives are to (a) actively engage students who have little investment in the educational system; (b) open up new areas of learning where students don't have past history of failure; and (c) demonstrate to teachers ways in which computers may be integrated into the curriculum.

General Information. Approximately 100 students attend Sierra Mountain High School, an alternative "continuation" high school for students who, for one reason or another, have not been successful in a standard school environment. The school has a waiting list of students who have low achievement, low motivation, and low attendance. The computer program was developed by a teacher as a pilot demonstration project with 10-15 students and initiated in January 1984. Only students who were interested got involved. The computer lab is a "hands-on" learning lab to demonstrate how computers can be used effectively in teaching English, programming, and music. There is a minimum of drill and practice. Students quickly take control of the computer and use it for word processing, simulations, and problem-solving. The lab has become a regular part of the school's curriculum and is available to all students, with about 35 students participating per semester.

Activities. Students work with programming (Logo), problem solving, simulations, word processing, and musical programs (synthesizers and computers). Students work individually most of the time; about 30% of the time they work in pairs.

Equipment and Software. Software in use includes Logo I, High Rise, Adventure Construction Set, Flight Simulator, Homeward, Print Shop, The Factory, and Sherwood Forest. Hardware includes eight computers. Classroom facilities also include a working darkroom, a yearbook layout area, a music center with five synthesizers, and a small digital recording studio.

Results. The computer instructor observes that about 75% of the students have become effectively engaged. Students who have not been effectively engaged in the program are those who have had chronic truant problems and many who have no home support systems.

The computer lab is the most used facility in school during lunch, after school, and in the evenings. The program has expanded so that it is now available to all students in the school and to evening students in an independent study program. Students have developed positive attitudes that extend beyond the computer program.

Implementation Factors. Factors that have contributed to the success of the program are (a) flexible class environments; (b) the experimental nature of software and programs; and (c) interest at the student level.

Classes in the lab are mostly ongoing process classes that change frequently due to the interests and attention spans of the students. The instructor has spent only three years in the computer field and considers himself to be very much a student/learner himself. He believes that teachers will need to feel more comfortable with the student/learner positions as the information revolution continues.

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SIERRA-PLUMAS JOINT UNIFIED SCHOOL DISTRICT

DOWNIEVILLE, CALIFORNIA

Program Description. A district-wide Sierra-Plumas computer education program is targeted to all of its rural students in grades K-12. Of the 650 district students in the program (includes summer school classes), 80 are Hispanic (over 12%); approximately half are male, half female. All students are required to be "operational" on the computer before graduation. The primary goal is that students are afforded equal opportunity for access to computers and computer learning.

General Information. The district has an ambitious scope and sequence chart where computers are introduced in kindergarten. In the lower grades, keyboarding, system components, computer operations, care of software and hardware, and computer assisted learning are introduced. Drill and practice, educational games, and Logo are the computer activities introduced and taught in grades K-3. Tutorials and simulations are introduced and taught in grades 4-12; problem solving is introduced in grade 10 and taught in grades 11-12.

Teachers, parents, and older students determined the need for the program. Computer-using teachers planned and designed the program, and computer-using teachers and the curriculum coordinator initiated the program. The superintendent and school board made the program a regular part of the school's offerings.

Activities. Students work at tasks and activities in the areas of problem solving, simulations, and word processing. Programming, spreadsheet applications, accessing databases for classroom research, and the use of database software in general are available in elective courses. Students work individually, in pairs, or in groups of four or more.

Equipment and Software. A wide variety of software applications is used (see "Activities," above). There is one computer for every 20 students in the program.

Results. There have been higher SAT scores for a small group of students who are "into" computers. More computers and software packages have been added. Evaluation is planned for next year.

Implementation Factors. Administrative support was an important factor contributing to the success of program.

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SIR FRANCIS DRAKE ELEMENTARY SCHOOL

SAN FRANCISCO, CALIFORNIA

Program Description. Sir Francis Drake Elementary, like George Washington Carver, is one of four schools in the Bayview/Hunters Point section of San Francisco that have been targeted for major change under a desegregation Consent Decree entered into by the National Association for the Advancement of Colored People, the California State Department of Education, and the San Francisco Unified School District. It was agreed that major emphasis would be placed on the improvement of the quality of educational services of the four schools in order to attract youngsters from various racial/ethnic groups in the city to these sites. A keystone of the programs of these consent decree schools is their focus on computers in education.

Knowing that parents throughout the district must believe that if their children enroll in Drake (or one of the other three schools), they will learn more effectively, learn more, and/or learn different skills than they will if they attend other schools in the district, Drake staff has worked together to create a school that has a number of exemplary programs. One of them is the computer program. Goals and objectives of the program are to (a) meet legal requirements of the consent decree; (b) develop model program for a magnet school; (c) attract students from out of the attendance area; and (d) increase academic test scores of students.

General Information. Drake has an ethnically-mixed student population of 338, 37% of whom are Black, 17% Hispanic, 14% Samoan, 7% Indochinese, 5% Filipino, 4% Chinese, 3% White, and 1% Native American, and 13% other non-White. The school has 76 computers for a school population of 338. Twenty-one teaching stations in a lab are networked to provide drill and practice in reading and math. The curriculum in the lab follows the school district's targeted objectives and district-adopted reading program. Testing is done every four weeks, and students are regrouped on the results of their tests.

In addition to the lab, computers are used in classrooms. Students use computers in every grade, developing keyboard skills and learning to use the computer for writing. Most of the information that goes home to parents--letters and newsletters--are done on the computer. Parents are also involved in parent education classes; one section is offered one afternoon a week, and another section is offered one evening a week. Some of the parents are working with software that will help them pass the test for a high school diploma.

Activities. Computer program activities include computer-assisted instruction in math and reading, word processing, keyboarding, oral language development, and GED preparation. Students work individually.

Equipment and Software. Software in use includes Piewriter, Appleworks, Printshop, and programs from the Computer Curriculum Corporation. There are 76 computers located in 21 teaching centers, a ratio of one computer for every 4.5 students in the school.

Results. The integration strategy seems to be working; the school has gone from 71% Black to 38% Black in a year and a half. Of course, it is difficult to credit the success to any one aspect of the whole school program, but the use of computers seems to be an important factor.

Implementation Factors. Factors seen as important to the success of the program include an excellent staff, a supportive principal and district administration, and the high funding level provided as a result of the desegregation consent decree.

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Program Description. The computer program at Southside is called Chapter 1 Reading and Math and is targeted to rural elementary students in grades one through six who are low-achievers (educationally disadvantaged) or limited English-speaking (English as a Second Language--ESL). Program goals and objectives are to (a) raise students to grade level in reading and math; (b) reinforce students' class work; and (c) have students develop a sense of accomplishment.

General Information. The program began in 1979 with 17 students. Students were identified on the basis of low standardized test scores and their classification as ESL. The program focuses on reading and math software for grades 1-6, including MECC software.

The local school district determined the need for and initiated the program and included teachers in designing and planning the program. Both the State and the district were instrumental in making the program a regular part of the schools' offerings. The program has expanded and now includes separate classes for ESL and Chapter 1 students.

Activities. Program activities include simulations and word processing. Students work individually and occasionally in pairs.

Equipment and Software: Software used includes Bank Street Writer and Speller and software from MECC. There is a ratio of 1 computer for every 44 students in the school.

Results. The State Department of Education conducts a yearly evaluation of the program. The effect on student achievement has been positive as seen by reported gains in SAT scores. The overall effectiveness of the program is reported as "good" by the school staff.

Implementation Factors. Teachers' support is seen as a key factor in the success of the program.

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Program Description. The computer program at Terra Nuova is called the Sister School Project and is targeted to all 13 elementary students enrolled in the school, nine of whom are White and four of whom are Asian. Students' ages range from six to nine years; four are male and nine are female. Goals and objectives of the program are to (a) permit interaction among students from different backgrounds who would not otherwise have the opportunity to do so; (b) become familiar with a variety of uses of computers (especially telecommunications); and (c) experience positive encounters with others as a model for peaceful exchange of ideas on a worldwide basis.

General Information. The Sister School Project has evolved through several years of work between Terra Nuova and Foresthill Union Elementary School in Foresthill, California. During the first years of implementation, students simply chatted using the computer, becoming acquainted and sharing hobbies and interests. The instructors then introduced creative story writing and chess games; a series of book talks began in 1983-84.

The teachers at both schools evolved the idea for the book talks and have implemented it for the past two years. The book talks have become a regular part of the curriculum and are focused currently on an interactive discussion of Junior Great Books stories. Students from Terra Nuova and Foresthill "talk" using split-screen software once a week. The sponsoring instructors at the two schools decide on the story; both groups of students then read it and generate questions. They call each other up using modems, and a discussion ensues.

Terra Nuova is a one-classroom school where students usually work in pairs, although occasionally students like to work alone. For the Sister School book talks, a group of four or five students works together with the teacher. These talks are open to anyone in the class with a reading level that allows comprehension of the story.

The original funding for the program and selection of participating schools came from the Atari Institute for Educational Action Research. The program began as a pilot project at several Sister Schools, including Terra Nuova and Foresthill. The institute no longer exists, and the only two remaining Sister Schools still working together are Foresthill and Terra Nuova.

Activities. Activities include problem solving and using modems for telecommunications. For the book talks, students typically work in groups of four or five.

The Sister School project is just one facet of computer use in the school. The computers are also available to students through scheduled turn-taking for other activities of educational games, drill and practice, word processing, problem solving, and simulations.

Equipment and Software. Software is a public domain communications program that allows a split-screen mode. Both groups of students can type at the same time and see what the other group is saying. Many other kinds of software are also available. There are two computers for the 13 students at Terra Nuova.

Results. The teachers involved have conducted informal evaluations. They have seen their students disagree on issues, think about and express their opinions, and see more deeply into what is going on as the other side stated their ideas. The children at the two schools seemed to represent rural/urban views, which come up in some discussions. Familiarity with the machine and involvement with it through their own computer work make the conversations comfortable and exciting for the students. The instructors have found the book talks to be valuable experiences for their classes. They also feel that students seem to be reading more carefully and posing more thoughtful questions than before the talks began. Students are gaining experience with telecommunications and feeling comfortable exploring possibilities for using the computer.

Implementation Factors. Several factors contributed to the implementation of the program and have influenced the results so far. A computer company made the project possible with the initial grant, paying for the phone lines for the first few years as well. Also crucial to the project was the free rein given by the sponsoring company--the idea that the teachers involved would come up with interesting and effective uses for the equipment as time passed. That kind of trust and support has proven invaluable.

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Program Description. The computer program at Theuerkauf School is targeted to low-achieving students and ESL bilingual students in grades one through four. The goals and objectives of the program are to (a) reinforce classroom instruction to enhance student achievement; (b) develop comprehension and usage of English language so students will be successful in academic areas; and (3) to foster self-esteem in limited-English-speaking and low-achieving students.

General Information. Theuerkauf School is a primary school (grades K-4) of 336 students in an elementary district of 1800 students. The school enrolls a variety of ethnic groups who have English as their second language, including Hispanic (15% of school population), Pacific Islander (12%), Asian (7%), and other (3%). In 1984-85, a teacher and site administrator, with input from classroom and administrative staff, created a pilot computer skills lab program for 90 students that mixed ESL and low-achieving but fluent English speaking children. The need was determined by the Board of Trustees and Superintendent after a series of four site meetings throughout the district. During the program's first year, the children were given four hours per week of instruction in phonics, reading comprehension, problem solving/logic, math measurement, money, time, and oral language development to reinforce areas of classroom instruction where the students were weak, as determined by the regular classroom teachers at grade level meetings once a month. This program was augmented by an additional 7 hours a week in the Whisman Language Program for the non-English speaking students.

Because of the program's success, the district Superintendent offered the Theuerkauf staff the opportunity to expand the skills lab program to all children in grades one through three in the second year, with curricula designed to meet the needs of ESL/low achieving students, middle level students, and academically inclined students. A "Diversity" teacher was added to run a program similar to the skills lab program, but without computers. The computer skills lab emphasizes math skills with heavy language components (graphing, measurement, money, time, word problems, etc.) and thinking skills/logic training for ESL/low achievers; similar math/thinking skills/logic skills with database applications for the middle students; Logo, word processing and database for the academically inclined students. The "Diversity" program emphasizes reading and reinforcement. Each of two groups of students per grade level spend 4-6 weeks in one program, then switch for 4-6 weeks in the other. The two teachers meet regularly with classroom teachers to plan the curriculum for the ESL, low, and middle level students. The academically inclined program is designed by the skills lab and Diversity teachers.

The program served 90 ESL/low-achievers in the first year and all students in grades 1-3 (134) and all ESL fourth-graders (15) in the second year. Student selection in the first year was based on ESL test scores and teacher referrals; selection in the second year was based on reading placement and ESL test scores. Key elements in the program are: (1) regular meetings with

classroom teachers as a group by grade level to determine student needs; (2) computer material that closely articulates with instruction; (3) mixing of ESL (good academic models) with low achievers (good English language models); (4) supplemental support for non-English-speakers in the Whisman Language program; (5) close articulation between computer/skills lab program and Diversity program; and (6) excellent administrative support, both on-site and at the district office.

Activities. All students come to either the computer skills lab or the Diversity room daily for 50-minute periods, made possible in part through extending the school day to 300 minutes. In the computer lab, students work in pairs or groups of three, with occasional groups of four for cooperative learning activities in database and word processing. Computer activities are varied and include programming (Logo), problem solving, simulations, word processing, and database.

Equipment and Software. The program uses five computers for 20 to 30 children per hour. A variety of software has been used: Secret Filer and Microzine for early database; Bank Street Writer for word processing; Gertrude's Secrets, Gertrude's Puzzles, Moptown Parade, Moptown Hotel, Bumble Games, Bumble Plot, Number Stumper, and Microzines for problem solving/logic development; and MECC social studies for simulations.

Results. Informal assessment by classroom teachers indicates that more students became successful in academic performance. Teachers also observed in students increased excitement about academic learning as well as growth in abilities to use computers. Although scores on standardized tests have not been obtained, the general impression is that the program has been highly successful. The first year of operation resulted in increased attention and support from district staff and a school-site decision to increase the program scope and numbers of children served. The superintendent selected it as a model for other programs in the district.

Implementation Factors. Factors that seem to have contributed to the success of the program are: (1) teacher involvement; (2) administrative support; (3) a knowledgeable computer skills teacher with a lot of enthusiasm and an extensive background in speech and language development, teaching techniques, and computer use in CAI, word processing, database, and Logo; and (4) a support network of computer teachers and software designers who provided much technical advice.

Contact Person:

Pat Neu
Theuerkauf School
1625 San Luis Avenue
Mountain View, CA 94043
Telephone: (415) 967-5593

TRANER MIDDLE SCHOOL

RENO, NEVADA

Program Description. A computer program at Traner serves minority and female middle-school students. The computer course introduces functions and principles of computers, computer ethics, basic construction, and effects on society and populations. After the introduction, students learn programming in BASIC and experience hands-on usage of microcomputers. Goals and objectives are then (a) to obtain student awareness of computers and their capabilities; (b) a basic understanding of operation; (c) computer ethics; and (d) an introduction to BASIC.

General Information. Traner Middle School has 500 students; of the 60 students enrolled in the computer program, 60% are female and 40% are male. The program was not designed for any particular types of students, but the ethnic composition of the group in the computer program reflects the percentages of ethnic groups attending the school: roughly 60% White, 10% Black, 10% Hispanic, 10% Asian, and 10% Native American and Pacific Islanders. The current instructor determined the need for the program and planned and designed it; the instructor and the principal initiated the program and made it a regular part of the school's offerings.

The program began in the 1983-84 school year with 40 students. The program has been changed from a semester course to a 9-week course with 15 students in each class, allowing more students to participate.

Activities. Program activities include programming, problem solving, and simulations. Students work in groups of three at the computers.

Equipment and Software. Three computers and the accompanying commercial software are used, including BASIC programming language. A printer is not yet available for use by the students.

Results. No formal evaluation has been conducted, but the computer instructor believes the computer course has resulted in a greater awareness of computer applications and usage by students. Students are very enthusiastic about the course and about having hands-on experience with computers.

Contact Person.

Dennis R. Boulton
Teacher
Traner Middle School
1700 Carville Road
Reno, Nevada 89512

Telephone: (702) 323-0382

WASHINGTON COUNTY SCHOOL DISTRICT

WASHINGTON COUNTY, UTAH

Program Description. A Washington County district-wide program is called Information Technology: Utah State Basic Technological Core and is targeted to all its mostly rural students in the district at the K-12 level. In grades K-6, the focus is on computer literacy; in Junior High the emphasis is on computer utilization. The long-range plan for the high school level is to offer an introductory course in Computer Applications, followed by courses in Information Processing, Computerized Bookkeeping, Computers in Management, BASIC Programming, and AP Computer Science (PASCAL). Other courses recommended for inclusion are Robotics and Microprocessor Computer Repair.

General Information. Washington County Schools have a total population of 9,226 students, mostly rural and mostly White, but the district enrolls 50 Native Americans. This program is a pilot program, begun in 1984-85 in response to state requirements for computer education courses. An implementation plan includes written standards, objectives, and descriptions of competencies for each grade level, K-12. Information about actual implementation is not yet available.

Activities. Computer activities at various grade levels in the plan include programming, problem solving, simulations, word processing, spreadsheets and other financial software, database software, using modems for telecommunications, and accessing databases for classroom research.

Equipment and Software. Each middle school should have a computer lab containing 16 computer stations and 16 work tables with 8 printers that have graphic capabilities; each elementary school should have a computer lab with 16 computers and 8 printers; and each high school should have 16 new tables, 8 printers, and 16 new computers of a more technologically advanced state, with the most popular business software, BASIC interpreters, and PASCAL compilers.

Implementation Fac A district implementation plan for grades K-12, written by the project chairperson, notes some implementation problems--namely, the enactment of state requirements without adequate funding for the equipment and software needed to implement the program. At the outset, the committee for developing the program plan realized that the expense of setting up this program is prohibitive and felt that a plan should be set at the district level to find funding to meet the equipment and software requirements in the implementation period.

Contact Person:

Paul Fawson
Administrator
Washington County School District
189 West Tabernacle Street
St. George, UT 84770

Telephone: (801) 673-3553

WEBER COUNTY SCHOOL DISTRICT

WEBER COUNTY, UTAH

Program Description. The Computer Data Processing program in the Weber County Schools targets all tenth- to twelfth-grade students in its three rural high schools who are not enrolled in computer programming courses. The program is an introduction to applications of word processing, spreadsheets, and databases. The goal of the program is to provide all students with the skills appropriate for business, office, and personal use. The objectives are that each student will be able to use an integrated software package to (a) write (word process), (b) manipulate and process data (data base), and (c) process numerical data (spreadsheet).

General Information. Ninety percent of the total high school population of 4500 students at Weber, Roy, and Bonneville High Schools participate in this program. The program began as an optional course but is now required in order to meet state requirements. In order to graduate, every student must take this program or a programming course: most students choose the data processing option. The computer specialist and vocational director determined the need, designed and planned, and initiated the program. They also incorporated the program into the regular school's offerings, thereby ensuring that students will meet the state requirements for graduation. Classes in each school are held in computer labs with 32 computers dedicated to this program.

Activities. Computer activities are focused on applications including word processing, spreadsheets, and data base management. Students work individually at computers.

Equipment and Software. The software used is Appleworks. Across the three high schools there are five labs, each with 32 computers, one for each student in a class. The computers are networked to printers.

Results. No formal evaluation has been conducted, but teachers observe that enrollment was rising even before the course became required. Non-computer teachers are asking for training. They are pleased with the response of students and the practical nature of the course. Teacher and student enthusiasm continue to increase, and many students use the lab for personal needs.

Implementation Factors. Factors which have contributed to the success of the program are: (1) (paid) inservice training for teachers, (2) the number of computers--one per student, (3) the purchase of high quality software with legitimate copies and documentation for each machine, and (4) curriculum development time for teachers who have written their own text.

Problems that occurred in implementing the program were: (1) insufficient training for teachers, resolved by offering more inservice training, (2) poor quality of software, changed by buying a different brand of computer and new software, and (3) insufficient support, corrected by acquiring more money for discs, development, and storage space.

Contact Person:

Dave Lundstrom
Administrator
Weber School District
1122 Washington Blvd.
Ogden, UT 84404

Telephone: (801) 394-6661

Program Description. The computer programs at Winnemucca are administered through the Computer Science program and the Computer Club and are targeted to rural junior high school students. The four subject areas in the Computer Science program are (1) Introduction to Computer Operation; (2) History of the Computer; (3) Computer-Related Careers; and (4) Programming Logic and Syntax. Word processing and graphics activities are conducted through the Computer Club.

General Information. The computer teacher determined the need for a computer program, planned and designed it, and then initiated the program in the 1983-84 school year. Since the initiation of the program, a second class in computer science has been added. The computer classes have now become a regular part of the junior high curriculum.

Activities. Student activities involve programming, problem solving, simulations, word processing, and computer-assisted instruction.

Equipment and Software. Software applications in use include Microzine, Softswap, Bank Street Writer, and local teacher-developed software.

Results. No evaluation has been conducted.

Contact Person:

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Teacher
Winnemucca Junior High
Humboldt County School District
P.O. Box 712
Winnemucca, NV 89445

Telephone: (702) 623-3417

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Programs in this directory are categorized below according to: types of underserved students identified (low-achieving, low-income, limited English-speaking, female, rural and minority groups); geographic location (California, Nevada, or Utah); and school level (elementary, middle/junior high, high school, or adult). The programs are listed alphabetically in the directory for ease of locating them.

Low-Achieving Students

Bachrodt Elementary School
Bell Avenue School
Calvin Simmons Junior High School
Dr. Martin Luther King Junior High School
Far West Laboratory
Gardnerville Elementary School
George Washington Carver Elementary School
Hawes Elementary School
Institute of Computer Technology
Jordan Elementary School
Mission San Jose High School
Paul Revere Elementary School
Peninsula Academies
River City Senior High School
Salt Lake Community High School
San Jose Unified School District
San Juan Unified School District
Sierra Mountain High School
Sir Francis Drake Elementary School
Southside Elementary School
Theuerkauf School

Low-Income Students

American Institutes for Research--Big Brothers/Sisters of Santa Clara County
Bell Avenue School
Calvin Simmons Junior High School
Dr. Martin Luther King Junior High School
Far West Laboratory
Franklin Year Round School
George Washington Carver Elementary School
Institute of Computer Technology
Paul Revere Elementary School
Peninsula Academies
River City Senior High School
Salt Lake Community High School
Sir Francis Drake Elementary School

Limited English-Speaking Students [the reader is also referred to the Hispanic and Asian student categories, as those programs are likely to deal with bilingual or LES students, even though the language factor was not specifically mentioned]

Calvin Simmons Junior High School
Crittenden Middle School
Empire Gardens Elementary School
Far West Laboratory
Franklin Year Round School
Gardnerville Elementary School
Hawes Elementary School
Jordan Elementary School
Newcomer High School
Oro Loma Elementary School
Paul Revere Elementary School
St. John Ursuline School for Girls
Salt Lake Community High School
San Jose Unified School District
Theuerkauf School

Female Students

American Institutes for Research--Big Brothers/Sisters of Santa Clara County
Duchesne School District
Far West Laboratory
Grant High School
Institute of Computer Technology
Logan High School
McKinleyville High School
Peninsula Academies
Phillip Burton Academic High School
St. John Ursuline School for Girls
Salt Lake Community High School
San Leandro High School
Terra Nuova Montessori School
Traner Middle School

Rural Students

Albert Lowry High School
Houston Elementary School
Ivanhoe Elementary School
Jordan Elementary School
McDermitt Combined School
McKinleyville High School
Mendocino High School
Mount Shasta High School
North Coast High School
Quincy Junior/Senior High School
Sierra Mountain High School
Sierra-Plumas Joint Unified School District

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Southside Elementary School
Washington County School District
Weber County School District
Winnemucca Junior High School

Black Students

Calvin Simmons Junior High School
Dr. Martin Luther King Junior High School
Educational Products Information Exchange (EPIE)
Franklin Year Round School
George Washington Carver Elementary School
Grant High School
Logan High School
Mathematics, Engineering, Science Achievement--East Bay Center
Peninsula Academies
Phillip Burton Academic High School
River City Senior High School
St. John Ursuline School for Girls
Salt Lake Community High School
Sir Francis Drake Elementary School
Traner Middle School

Hispanic Students

Bachrodt Elementary School
Calvin Simmons Junior High School
Dr. Martin Luther King Junior High School
Educational Products Information Exchange (EPIE)
Empire Gardens Elementary School
Far West Laboratory
Franklin Year Round School
Gardnerville Elementary School
George Washington Carver Elementary School
Hawes Elementary School
Houston Elementary School
Ivanhoe Elementary School
Jordan Elementary School
Joseph George Middle School
Logan High School
Mathematics, Engineering, Science Achievement--East Bay Center
McDermitt Combined School
McKinleyville High School
Newcomer High School
Oro Loma Elementary School
Peninsula Academies
River City Senior High School
St. John Ursuline School for Girls
Salt Lake Community High School
San Jose Unified School District
Sir Francis Drake Elementary School
Traner Middle School

Asian Students [including Filipino and Pacific Islander]

Calvin Simmons Junior High School
Crittenden Middle School
Dr. Martin Luther King Junior High School
Empire Gardens Elementary School
Far West Laboratory
Franklin Year Round School
George Washington Carver Elementary School
Houston Elementary School
Logan High School
Newcomer High School
Peninsula Academies
Phillip Burton Academic High School
River City Senior High School
Salt Lake Community High School
Sir Francis Drake Elementary School
Terra Nuova Montessori School
Traner Middle School

Native American Students

McDermitt Combined School
McKinleyville High School
Salt Lake Community High School
San Juan Unified School District
Traner Middle School
Washington County School District

California

American Institutes for Research--Big Brothers/Sisters of Santa Clara County
Bachrodt Elementary School
Bell Avenue School
Calvin Simmons Junior High School
Crittenden Middle School
Dr. Martin Luther King Junior High School
Educational Products Information Exchange (EPIE)
Empire Gardens Elementary School
Far West Laboratory
Franklin Year Round School
George Washington Carver Elementary School
Grant High School
Hawes Elementary School
Houston Elementary School
Institute of Computer Technology
Ivanhoe Elementary School
Jordan Elementary School
Joseph George Middle School
Logan High School

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Mathematics, Engineering, Science Achievement--East Bay Center
 McKinleyville High School
 Mendocino High School
 Mission San Jose High School
 Mount Shasta High School
 Newcomer High School
 North Coast High School
 Oro Loma Elementary School
 Paul Revere Elementary School
 Peninsula Academies
 Phillip Burton Academic High School
 Quincy Junior/Senior High School
 River City Senior High School
 St. John Ursuline School for Girls
 San Jose Unified School District
 San Juan Unified School District
 San Leandro High School
 Sierra Mountain High School
 Sierra-Plumas Joint Unified School District
 Sir Francis Drake Elementary School
 Terra Nuova Montessori School
 Theuerkauf School

Nevada

Albert Lowry High School
 Gardnerville Elementary School
 McDermitt Combined School
 Southside Elementary School
 Traner Middle School
 Winnemucca Junior High School

Utah

Duchesne School District
 Salt Lake Community High School
 Washington County School District
 Weber County School District

Elementary Schools

American Institutes for Research--Big Brothers/Sisters of Santa Clara County
 Bachrodt Elementary School
 Bell Avenue School
 Empire Gardens Elementary School
 Franklin Year Round School
 Gardnerville Elementary School
 George Washington Carver Elementary School
 Hawes Elementary School
 Houston Elementary School
 Ivanhoe Elementary School

Jordan Elementary School
McDermitt Combined School
Oro Loma Elementary School
Paul Revere Elementary School
San Juan Unified School District
Sierra-Plumas Joint Unified School District
Sir Francis Drake Elementary School
Southside Elementary School
Terra Nuova Montessori School
Theuerkauf School
Washington County School District

Middle/Junior High Schools

American Institutes for Research--Big Brothers/Sisters of Santa Clara County
Calvin Simmons Junior High School
Crittenden Middle School
Dr. Martin Luther King Junior High School
Educational Products Information Exchange (EPIE)
Joseph George Middle School
Mathematics, Engineering, Science Achievement--East Bay Center
McDermitt Combined School
Quincy Junior/Senior High School
Salt Lake Community High School
San Jose Unified School District
Sierra-Plumas Joint Unified School District
Traner Middle School
Washington County School District
Winnemucca Junior High School

Senior High Schools

Albert Lowry High School
Far West Laboratory
Grant High School
Institute of Computer Technology
Logan High School
Mathematics, Engineering, Science Achievement--East Bay Center
McKinleyville High School
Mendocino High School
Mission San Jose High School
Mount Shasta High School
Newcomer High School
North Coast High School
Peninsula Academies
Phillip Burton Academic High School
River City Senior High School
St. John Ursuline School for Girls
Salt Lake Community High School
San Jose Unified School District
San Leandro High School
Sierra Mountain High School

Sierra-Plumas Joint Unified School District
Washington County School District
Weber County School District

Adults and Continuation Schools

Duchesne School District
Educational Products Information Exchange (EPIE)
Grant High School
Jordan Elementary School
Salt Lake Community High School

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OTHER SELECTED RESOURCES

Equitable Access to Computers

Other Selected Publications (See Introduction for list of publications from the Far West Laboratory)

Computers, Equity, and Urban Schools. (1985). Educational Technology Center, Harvard University.

This booklet is a report of an invitational working conference, held in November 1984 at the Educational Technology Center, to explore issues pertaining to uses of educational technology in urban schools and to recommend steps toward policy and program development.

The Computing Teacher, theme issue on computer equity. (1984, April). The Journal of the International Council for Computers in Education.

This entire issue was devoted to articles about equity and computers by a variety of authors. Articles pertain to an overview of the issues, as well as research and practical ideas. It is a good introduction to and overview of computer equity and some of the people and organizations who are concerned about it.

Other Selected Organizations Involved with Computer Equity

Center for Educational Equity, American Institutes for Research. P.O. Box 1113, Palo Alto, CA 94302, (415) 493-3550. Contacts: Jane Schubert, Jean Wolman.

The Center for Educational Equity, funded by the U.S. Department of Education, promotes sex equity in educational programs in Arizona, California, and Nevada, in collaboration with local education agencies. Project SEE (Sex Equity in Education), in cooperation with the CA State Department of Education, provides staff development and training for integrating computers in education.

SISCOM, funded under the Women's Educational Equity Act (WEEA), is a collaborative project with Big Brothers/Big Sisters to provide a co-learning approach to computer competence for Big and Little Sister pairs and is aimed at disadvantaged young girls from single parent homes.

Ideas for Equitable Computer Learning is a resource packet published by the Center for Educational Equity to help educators improve computer learning opportunities for all students. Instructional strategies are suggested for lowering barriers to computer access and use.

Computers in Schools Project, National Commission on Industrial Innovation, 1125 West Sixth St., Suite 300, Los Angeles, CA 90017, (213) 481-0205. Contact: Judith Johns Hubner.

The Computers in Schools Project has a primary concern for equitable access to technology in education, with a special interest in the area of telecommunications. The project sponsors periodic meetings with representatives of major educational groups in California and undertakes special projects promoting exemplary uses of computers in schools.

Council of Chief State School Officers Resource Center on Educational Equity (CCSSO), 400 North Capitol St., N. W., Suite 379, Washington, D. C. 20001, (202) 393-8159.

This resource center maintains concerns and projects dealing with a variety of equity issues and publishes Concerns, a newsletter about educational equity issues. Issue XII, June 1984 focused on computer equity.

Educational Products Information Exchange (EPIE), 4-C Project, P.O. Box 786, Kenwood, CA 95452, (707) 833-4621. Contact: Richard Wenn.

The Community-Classroom Computer Connection (4-C) project is a cooperative program with the MESA (Mathematics, Engineering, Science Achievement) program at the University of California-Berkeley Center and area middle and junior high schools to provide urban minority students and their families with the skills they need to use computers at home for educational activities. The program provides instruction to parents and students and a checkout program for using computers at home. EPIE also maintains an online database on CompuServe focusing on equity and technology.

EQUALS in Computer Technology, Lawrence Hall of Science, University of California, Berkeley, CA 94720, (415) 642-1823. Contact: Kay Gilliland.

This program offers inservice education to educators to increase their awareness of the importance of females' acquisition of technical competence. It provides practical classroom strategies and materials that (1) encourage girls and minorities to enroll in computer courses, (2) help develop thinking skills in areas necessary for technical work, and (3) provide experiences and information that will enable students to master technology.

Hispanic Education and Technology (H.E.A.T.) Network, School of Education, Stanford University, Stanford, CA 94305, (415) 497-1297. Contacts: Beatriz Arias, Liza Loop.

This project is an effort to link together, especially through electronic networking, educators and researchers concerned with equitable access to technology in education for Hispanic students. Its aim is to study the patterns of dissemination of educational computing and other technology to the Hispanic community.

Mathematics, Engineering, Science Achievement, Lawrence Hall of Science, University of California, Berkeley, CA 94720, (415) 642-5064.

MESA is designed to increase the numbers of underrepresented minorities (especially Blacks, Chicanos/Mexican-Americans, Puerto Ricans, and American Indians) in mathematics-, engineering-, and science-related professions. Participating students receive educational enrichment and practical help needed to prepare for university-level programs. Computer training programs are included as a component in various MESA programs, especially during the summer.

Project on Equal Education Rights (PEER), 1413 K Street, N.W., Ninth Floor, Washington, DC 20005, (202) 332-7337. Contact: Leslie R. Wolfe.

PEER, a project of the NOW Legal Defense and Education Fund, focuses on a computer equity agenda that includes synthesizing current research and programmatic efforts, making an original contribution, publishing new reports and action kits, and identifying and publishing exemplary state and local computer equity programs.